

Appendix 2

# **ABERDEEN ADAPTS**

Aberdeen's Climate Adaptation Framework

*Building resilience and adapting to the changing climate*

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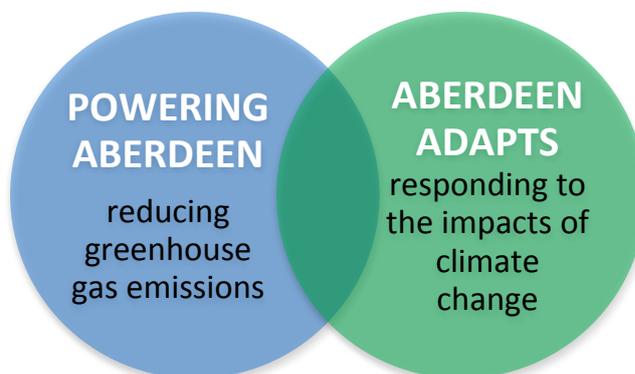
*Aberdeen Adapts Climate Change Framework*

# Executive summary

Aberdeen Adapts is a framework for city-wide working on adaptation. Incorporating the views of local organisations and communities, it sets the direction to build long term city resilience.

Aberdeen is already home to a range of low carbon initiatives including; hydrogen transport and infrastructure; a passive house nursery; expanding heat network; and community hydro scheme. But alongside work taking place to reduce emissions, there is a need to take action to prepare for inevitable changes in climate. This is called adaptation.

Aberdeen Adapts will sit alongside Powering Aberdeen, the city's Sustainable Energy Action Plan, to deliver a city-wide climate change programme.



## We need to adapt...

The global climate is changing and this is expected to accelerate in coming decades. For Aberdeen this will mean warmer, wetter winters; hotter, drier summers; a rise in sea level; and less snow, ice and frost.<sup>1</sup>

This framework sets the direction for adaptation, with priorities, goals and action areas that will help Aberdeen to prepare.

- It includes actions to **prevent** impacts from climate change and where there is likely to be change, to **protect** people and places.
- It understands that in some areas we need to learn more to **inform** decision making and that it is important to remain flexible in approach, to incorporate new information.
- In others, we should strive to **innovate** and make use of new technology.
- However, the key to adaptation for Aberdeen is to **collaborate**, share experiences, build knowledge and understanding and work together to develop solutions.

## Aberdeen has already started the adaptation journey...

Aberdeen Adapts builds on the strategic plans and local actions that are already helping to strengthen city resilience.

From the 210,000 trees planted for every citizen; to the development of Hazlehead as a Climate Change Park. From nature based flood schemes, such as those at Middlefield and Maidencraig; to the Seaton Wetland project and green roofs on city buildings. From the North East Flood Risk Management Plan to the integration of adaptation into city planning policy, as well as Local Transport, Open Space and Nature Conservation Strategies.

**By learning from these measures, Aberdeen is well placed to develop the adaptation solutions that can make sure local people, places and businesses are climate ready.**

# Introduction

From wetter weather to warmer temperatures the climate is changing<sup>2</sup> and this will bring considerable new challenges for Aberdeen. This means our city will need to get ready, adjusting to the impacts and making the most of new opportunities.

Taking urgent climate action is one of the **UN Sustainable Development Goals** (Appendix 2)<sup>3</sup> and cities around the globe are taking active steps to adapt to climate change. In doing so, they are delivering long term solutions that protect people and places, as well as sustain innovation and growth. From coastal flood measures in New York, to greening of buildings in Chicago; and flood management and retrofitting adaptation solutions in London; cities are planning ahead to build resilience.



Aberdeen has seen the impacts of severe weather events. We just need to think back to Storm Frank, when the city experienced intense rainfall and flooding, local businesses were closed, transport was disrupted and people were evacuated from their homes.

This framework aims to establish a forward thinking, co-ordinated approach to improve the resilience of Aberdeen, helping to keep it open for business, reducing the risks and costs of damage and disruption, making sure what is important to citizens and what we value is protected for future generations.

## About Aberdeen Adapts

Aberdeen Adapts brought together 41 local public bodies, businesses and communities keen to work together to adapt to climate change. Their input was vital to the development of this framework. Consultation gathered information on local priorities, the key climate challenges affecting various city sectors and adaptation approaches for Aberdeen. In addition:

- 5 stakeholder workshops, as well as events and publications were used to build understanding and exchange information on local adaptation actions already underway.
- To make sure young people were considered, 6 classes from several schools took part in Climate Ready Places<sup>4</sup> workshops.
- An Arts and Climate Change Mini Festival was piloted, exploring new ways to engage the public in climate change
- Questions on climate change were included in a City Voice survey<sup>5</sup>, to ensure the wider views of local people were taken on board.

Climate change will affect organisations, businesses and communities across Aberdeen. As no individual organisation has all the solutions, an essential part of the process is building the foundation for lasting partnership work to direct and deliver adaptation action.

### Consultation

70 responses were received to a public consultation on Aberdeen Adapts. The responses indicated support for the Aberdeen Adapts priorities, goals and action areas. Comments have been incorporated into the final framework and environmental report. A summary of the consultation has been produced.

## Support from Adaptation Scotland

[Adaptation Scotland](#) provided support for the development of Aberdeen Adapts, following a competitive application process led by Aberdeen City Council and the University of Aberdeen. Their knowledge and expertise with other partnership projects including, Climate Ready Clyde and Edinburgh Adapts has enabled Aberdeen to draw on effective learning, actions and engagement processes.

The Adaptation Scotland programme provides information, advice and support on climate adaptation for organisations in Scotland. The programme is funded by the Scottish Government and delivered by [Sniffer](#).

Aberdeen Adapts has formed links with the University MSc course in Environmental Partnership Management. This has led to several student placements and student led surveys on adaptation, as well as a workshop using touch table technology.

## Acknowledgements

Incorporating the views of city organisations and communities who participated in the development of Aberdeen Adapts:

<ul style="list-style-type: none"> <li>• Adaptation Scotland</li> <li>• Aberdeen Performing Arts</li> <li>• Aberdeen Biodiversity Centre</li> <li>• Aberdeen City Council</li> <li>• Aberdeenshire Council</li> <li>• Aberdeen Climate Action</li> <li>• Aberdeen City Heritage Trust</li> <li>• Aberdeen City Health &amp; Social Care Partnership</li> <li>• Ashley Road Primary School</li> <li>• Archaeology Service</li> <li>• Bridge Of Don Academy</li> <li>• Bridge of Don Community Council</li> <li>• Castlehill and Pittodrie Community Council</li> <li>• Creative Carbon Scotland</li> <li>• Cults, Bieldside &amp; Milltimber Community Council</li> <li>• Culter Community Council</li> <li>• Dee Catchment Partnership</li> <li>• East Grampian Coastal Partnership</li> <li>• Forestry Commission</li> <li>• Friends of Seaton Park</li> </ul>	<ul style="list-style-type: none"> <li>• Garthdee Community Council</li> <li>• Grampian Energy</li> <li>• Grampian Housing Association</li> <li>• James Hutton Institute</li> <li>• Middlefield Community</li> <li>• NESTRANS</li> <li>• NESBReC</li> <li>• NHS Grampian</li> <li>• PAS – Planning Aid for Scotland</li> <li>• River Dee Trust</li> <li>• RGU</li> <li>• Scottish Enterprise</li> <li>• Scottish Flood Forum</li> <li>• Scottish Water</li> <li>• SEPA</li> <li>• SNH</li> <li>• SSE</li> <li>• Strategic Development Planning Authority</li> <li>• University of Aberdeen</li> <li>• Walking-the-Talk</li> <li>• Woodside Primary School</li> <li>• 2050 Climate Group</li> </ul>
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## Aligning with Powering Aberdeen

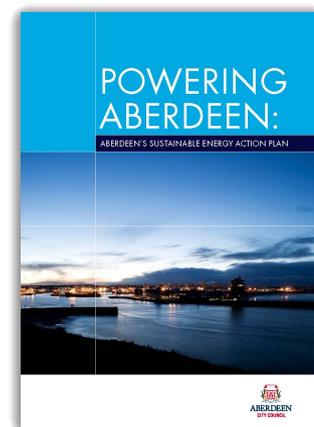
Powering Aberdeen<sup>6</sup> is Aberdeen's Sustainable Energy Action Plan, aiming to improve energy efficiency and increase uptake of alternative technologies in the city.

Reducing emissions, is essential to limit the impact of climate change. However, there will still be change. So, alongside work to reduce emissions under Powering Aberdeen, it will be essential to progress work so that Aberdeen Adapts.

These workstreams go hand in hand to work towards a low carbon, resilient city. Warmer temperatures may take more people out of fuel poverty, currently 24%<sup>7</sup> in Aberdeen. A changing climate could have positive and negative effects for the productivity of alternative energy. Improving the energy performance of our buildings can help with cooling, as well as warmth.

Aberdeen Adapts acknowledges these connections and work to develop the adaptation agenda will ensure these work streams are aligned.

## Strategic Environmental Assessment



A Strategic Environmental Assessment has been completed for Aberdeen Adapts, to meet the Environmental Assessment (Scotland) Act 2005. The Environmental Report sets out the likely effects of Aberdeen Adapts, including the priorities, goals and action areas, on the environment. It includes how significant negative effects could be addressed by mitigation and how any significant effects on the environment will be monitored. The findings were used to inform the Aberdeen Adapts Framework. Measures to work with partners to adapt to climate change and enhance the positive effects of Aberdeen Adapts, include:

- Reducing fragmentation; and protecting and enhancing biodiversity.
- Reducing emissions during any project development and protecting air quality.
- Making efficient use of water and protecting the water environment.
- Protecting soil health and stability
- Protecting and enhancing valued landscapes, their character and setting.
- Minimising risks to people in Aberdeen and their health.
- Protecting the historic environment.

# Why do we need Aberdeen Adapts?

Preparing for severe weather and climate change is essential to protect Aberdeen’s people, places, public bodies and businesses including:

<b>Protecting people</b>	<ul style="list-style-type: none"> <li>• Flooding, erosion, tidal surge and heatwave events could affect the health, safety and wellbeing of people who live work and visit Aberdeen.<sup>8</sup></li> <li>• For vulnerable people, the impacts could be even greater, widening inequalities.<sup>9</sup></li> </ul>
<b>Safeguarding assets</b>	<ul style="list-style-type: none"> <li>• Reduce damage to Aberdeen’s buildings and infrastructure; prevent a loss of value and increased insurance costs.</li> <li>• Preserve the structure and function of city assets.</li> </ul>
<b>Robust decision making</b>	<ul style="list-style-type: none"> <li>• What we build, how we invest, these decisions need to be robust, resilient and cost-effective in the long term. The effects of climate change are far ranging and the lifespan of projects and infrastructure can be affected.</li> <li>• Planning ahead, means there is time to build climate impacts into decision making, helping to keep planned investment secure.</li> </ul>
<b>Reduce costs</b>	<ul style="list-style-type: none"> <li>• Adaption makes good business sense, reducing economic risk and encouraging investor confidence.</li> <li>• Without interventions, the estimated average annual damages from flooding alone in Aberdeen could cost over £17 million.<sup>10</sup></li> <li>• By taking timely action, Aberdeen can access funding opportunities, has time to establish low or no cost adaptation responses and can mainstream adaptation into policy and decisions to avoid future costs.</li> </ul>
<b>Improving use of resources</b>	<ul style="list-style-type: none"> <li>• Organisations and businesses across Aberdeen will be facing climate challenges. A joined up approach can make best use of local resources, improve co-operation, avoid duplication and enhance business continuity.</li> <li>• By combining the knowledge and expertise from local business, organisations and further education, Aberdeen is a good position to develop smart solutions that are appropriate for the city.</li> </ul>
<b>Delivering multiple benefits</b>	<ul style="list-style-type: none"> <li>• Actions to adapt to climate change can deliver a range of benefits for the city. They can help to reduce energy costs and flood risk, increase biodiversity and support health and wellbeing. Maidencraig flood alleviation scheme is a great example of this helping to store flood water and prevent flooding downstream, while integrating paths to connect neighbourhoods and exploring opportunities for environmental improvements.</li> </ul>
<b>Meeting regulation</b>	<ul style="list-style-type: none"> <li>• Adapting to climate change is a legal duty, for most public sector organisations, under the <b>Climate Change (Scotland) Act 2009</b>.<sup>11</sup> This is to protect critical services and infrastructure.</li> <li>• Adaptation action should help deliver relevant outcomes under Climate Ready Scotland,<sup>12</sup> the Scottish Adaptation programme. This is updated every 5 years and addresses climate risks for Scotland identified in the UK Climate Risk Assessment.<sup>13</sup> The assessment findings are based on UK Climate Projections. Scotland’s second adaptation programme was published in 2019. It includes the vision “We live in a Scotland where our built and natural places, supporting infrastructure, economy and societies are climate ready, adaptable and resilient to climate change”.</li> </ul>

<b>UK Climate Projections</b>	<ul style="list-style-type: none"> <li>• UK Climate Projections provide evidence on projected changes to climate. Information from (UKCP18) will be used to inform planning and decision making in the first implementation phase of Aberdeen Adapts.</li> </ul>
<b>Supporting growth</b>	<ul style="list-style-type: none"> <li>• Adaptation brings potential opportunities for innovation, research, retrofit and skills development. The market for goods and services in this sector indicates a projected UK growth rate in the region of 7%.<sup>7</sup></li> <li>• Investor confidence is boosted in cities that have protected their place, people and prosperity, and seized new opportunities.</li> </ul>
<b>Supporting strategic outcomes</b>	<p>Drivers for adaptation are included in a range of plans, programmes and strategies. A co-ordinated approach to adaptation can help deliver wider city outcomes including:</p> <ul style="list-style-type: none"> <li>• The Community Planning Partnership, Local Outcome Improvement Plan, includes a climate change outcome to reduce emissions and adapt. Adaptation actions support the delivery of outcomes under people, place and economy</li> <li>• Regional and Local Transport Strategies have aims to ensure that the transport network is as resilient as possible to flooding and contingency conditions are developed.</li> <li>• Aberdeen’s Open Space and Nature Conservation Strategies both include considerations for climate change.</li> <li>• The North East Flood Risk Management Plan aims to address flood risk in the city, as part of a wider approach to managing flood risk in the region.</li> <li>• The Aberdeen Strategic Development Plan sets priorities for water efficiency and flood management. The Aberdeen Local Development Plan addresses flood risk and coastal threat.</li> </ul> <p>Embedding adaptation into revised and emerging city documents will help with work to meet regulation and strengthen city resilience. A full list of drivers for adaptation is set out in Appendix 3.</p>

## Aberdeen’s changing climate

In Scotland, there is already evidence of a changing climate. Temperature and rainfall increases have been observed over the last few decades and there has been a reduction in air and ground frost, as well as snow cover.

### Future climate - Aberdeen

UK Climate Projections show that these changes are likely to increase in the future. For Aberdeen, these indicate:

- ▶ A **reduction** in summer rainfall which could affect water quality and availability.
- ▶ An **increase** in autumn/winter rainfall. This won’t mean more rainy days, but when it does rain it will be much heavier.
- ▶ There will be an **increase** in temperatures across all seasons.
- ▶ In winter there will be **less** snow, ice and frost days, although there could still be an extreme snowfall event.
- ▶ In summer there will be an **increase** in temperatures and what we consider a heatwave could occur more frequently.
- ▶ There will be a **rise** in sea level.

An assessment of climate risks has been produced as a separate, supporting study and this has helped to inform Aberdeen Adapts.

# Climate challenges for Aberdeen

Familiar with experiencing all four seasons in just a day, Aberdeen tends to weather the weather, ready and prepared for the fluctuations.

However, what happens when this change is more significant? The climate is changing and this will bring more extreme and variable conditions, with consequences for the city.<sup>8</sup>

## **Increased risk of flooding**

Flooding has already had devastating impacts on many people living in Aberdeen. Climate change likely to alter rainfall patterns. More heavy downpours will bring rising rivers, place drainage systems under pressure, increasing flood risk in the future. This could affect properties and infrastructure – with serious consequences for people, heritage and businesses.

Although investment is being made in city flood prevention schemes, flooding may still occur. We need to continue to prevent development in areas at risk of flooding. We also need to adapt buildings that are already at risk, so they are less likely to be damaged by flood water and easier to clean up if flood water does occur. We also need to manage our outdoor spaces in ways that can help reduce the extent of flooding, providing space for flood water and absorbing rainfall through greenspace.

## **The change at our coast**

With rocky cliffs to the south, an active harbour, with a sandy beach, heading northwards from the River Dee and a dune system after the River Don, the coastline has always been a defining characteristic of Aberdeen and a vital part of the economy. Sea level has been gradually increasing but this rise is set to accelerate over coming decades. Along with storm surge conditions, this brings threat of coastal flooding, with potential consequences for existing coastal properties, infrastructure, businesses and public safety. Erosion and retreat in soft parts of the coastline is a dynamic, natural process but it can affect people and places. As a city we will need to make decisions about how to meet these challenges.

## **The performance of city buildings**

Climate change will have an impact on the design, construction, management and use of Aberdeen's buildings and surroundings, challenging building performance. Whether retrofitting existing structures or constructing new ones, city buildings will need to withstand heavy rainfall events, to reduce the risk of flooding and water penetration; and warmer temperatures to avoid overheating. More variable weather will need to be met with changes in design and maintenance to reduce the risk of more damage, leaks and damp, affecting people's health and insurance costs. Designs to increase water and energy efficiency will be needed to improve building resilience.

## **The availability and quality of water**

Heavy rainfall and flooding will result in more sediment, erosion and pollution to watercourses, Summer droughts may become more frequent and severe in Scotland causing problems for water quality and supply during periods of drier weather and low river flows. The River Dee provides drinking water for over 300,000 homes in Aberdeen and Aberdeenshire. As our climate warms and rainfall patterns change, there is likely to be increased competition for water between households, agriculture, industry and the needs of the natural environment. Growth for the city will need to prioritise water efficiency to avoid increasing demands on water supply.

## **Infrastructure – network connectivity and interdependencies.**

Energy, transport, water and ICT network support services are vital to local health, wellbeing and economic prosperity. Increased incidences of flooding, landslides, drought and heatwaves have the potential to cause major disruptions to the city. With infrastructure networks becoming increasingly interdependent, emergencies in one area can quickly spread. Adapting one element of infrastructure and leaving others unchanged will not be enough.

## **Disruption to transport routes**

Aberdeen's northerly location means there is a strong reliance on transport for goods, travel and business. From an international airport, to a busy city harbour and to active rail and road networks,

the performance of transport networks will be challenged by increased temperatures, heavy rainfall and flooding. Collaborative working on transport takes place at regional and local level and building in resilience will help to protect our transport network from damage and disruption.

#### **The health of our natural environment**

Climate change may affect the delicate balance of Scotland's ecosystems and transform Scotland's wildlife and habitats, adding to existing pressures. Some distinctive Scottish species may struggle and could be lost, invasive non-native species may thrive, while degraded habitats may not be able to sustain productive land or water supply.

This is the concern for all habitats and species in Aberdeen regardless of the level of protection afforded to them. However, the River Dee is protected by legislation as a Special Area of Conservation and climate change, in particular low rainfall, may alter the delicate ecological balance in the river. Species, such as freshwater pearl mussels and Atlantic salmon, may be unable to respond to these changing conditions.

#### **The health of our marine environment**

The effects of climate change, alongside other pressures on marine species – from plankton through to fish, mammals and sea birds – is already being noted. Rising sea temperatures are likely to affect food sources of marine species and lead to changes in distribution.

A warmer North Sea will favour deeper-water, warm-water species such as hake, but could be less favourable for cold water species such as haddock and white-beaked dolphin. Those who depend on the health of the sea, from local fisheries, to tourism operators, will need to decide how to collectively respond to these changes.

#### **The need for resilience and opportunities for businesses**

Climate change and extreme weather may cause damage to business stock, assets and premises and restrict services. Disruption to transport, energy and communication networks in Scotland and around the world could affect markets and supply chains, as well as raise insurance costs.

Understanding these impacts, there is a growing, global market for technology and services to help manage and reduce climate risks. With strong international links, businesses in Aberdeen are well placed to lead research and innovation in this area, to meet increasing market demand.

#### **The health and wellbeing of our people**

A warming climate may provide more opportunity to be outdoors and enjoy a healthy active lifestyle, while reducing winter heat and fuel costs.

However, periods of wetter, warmer weather could affect the old, young or those with some health conditions. It could increase air pollution, affecting health and raise the demands for energy intensive air conditioning. Climate change could increase levels of damp and affect patterns of disease and other health issues. These threats will have to be managed to reduce impact on people's physical and mental health.

#### **Aberdeen's cultural heritage and identity**

Flooding, landslip and vegetation change have the potential to alter land and seascapes affecting the character of the Granite City. Climate change is also a threat to Aberdeen's historic environment, causing potential damage and loss through coastal erosion, flooding and wetter, warmer conditions. Those involved in the care, protection and promotion of historic and cultural environments will have to consider the impact climate change could have on the features that give Aberdeen a sense of place and identity.

#### **The security and efficiency of our energy supply**

Climate change may influence Scotland's capacity to generate weather dependent renewable energy, for example varying water availability could affect hydro generation schemes and it could also increase solar potential. It could affect power distribution, with impacts ranging from damage through extreme weather, to reduced transmission efficiency as a result of temperature fluctuations. As an energy city Aberdeen will need to plan for these changes by building resilience into the way we produce energy and through actions to reduce energy demand.

### **The security of our food supply**

Climate change is already causing disruption to global food production. The north east of Scotland is dependent on strong supply chains and will be affected by shocks in global food markets. Increased volatility in these global markets could affect both supply of food and its cost, meaning common favourites may become scarcer or more expensive.

However, an increase in temperatures here in the north east will bring a longer growing season and potential opportunities for food producers and communities to grow more food locally.

### **The productivity of our woodlands**

The total tree canopy cover is just 10% in the city (2015). A warming climate has the potential to improve growing conditions in the north east and increase the productivity of Aberdeen's trees and woodlands. However, climate change will also pose a number of threat to tree health, from more variable and extreme weather causing periods of soil saturation and drought; to the spread of pests and diseases, which may limit this potential. Trees and woodlands in the city may be affected, with some species becoming less able to cope with the new conditions. This will require decisions to be made about how we manage these risks and what we plant, to ensure value to local health, nature and economy is protected.

### **The occurrence of pests and disease**

As our climate changes, it will create new conditions that may allow existing pests and disease to spread and new threats to become established in Scotland. If not properly managed, these pests and diseases have the potential to cause serious impact to the health of our people, animals, plants and ecosystems.

### **The quality of our soils**

We rely on soils to sustain biodiversity, support agriculture and forestry, regulate the water cycle and store carbon. Soils also have an historic environment value, as a proxy record of environmental change and for the preservation of archaeological deposits and artefacts. Heavy rainfall and changing temperatures will affect soils over time; and these changes may not be fully recognised until they become an issue, reducing soil function, increasing flood risk and causing erosion.

# Aberdeen Adapts Approach

Key overarching principles underpin the Aberdeen Adapts Framework and support adaptation for the city.

Prevent	• Build adaptation into plans, policies and ways of working and move beyond unique projects to mainstream action.
Protect	• By planning early interventions, we can take the most appropriate and cost-effective adaptation steps.
Inform	• Through research and cross sector actions we will build understanding of what works for Aberdeen.
Collaborate	• By working collaboratively we will exchange skills and knowledge; and co-ordinate adaptation activity.
Innovate	• Through innovation and technology we will explore adaptation solutions.

## About the Framework

**Priorities, goals and action areas** for city resilience were developed and reviewed with stakeholder input at a series of workshop sessions.

### ► Our Priorities

The Aberdeen Adapts Framework sets out 5 cross cutting **priorities**, providing a focus for adaptation in Aberdeen:

- Protecting buildings and infrastructure.
- Safeguarding our natural environment.
- A healthy society and strong economy.
- Building understanding.
- Collaborative working.

### ► Our Goals

Under each priority participants developed a series of **15 goals** set the long-term ambition for Aberdeen Adapts, helping to build a picture of what resilience could mean for the city by 2050, if it has taken steps to adapt.

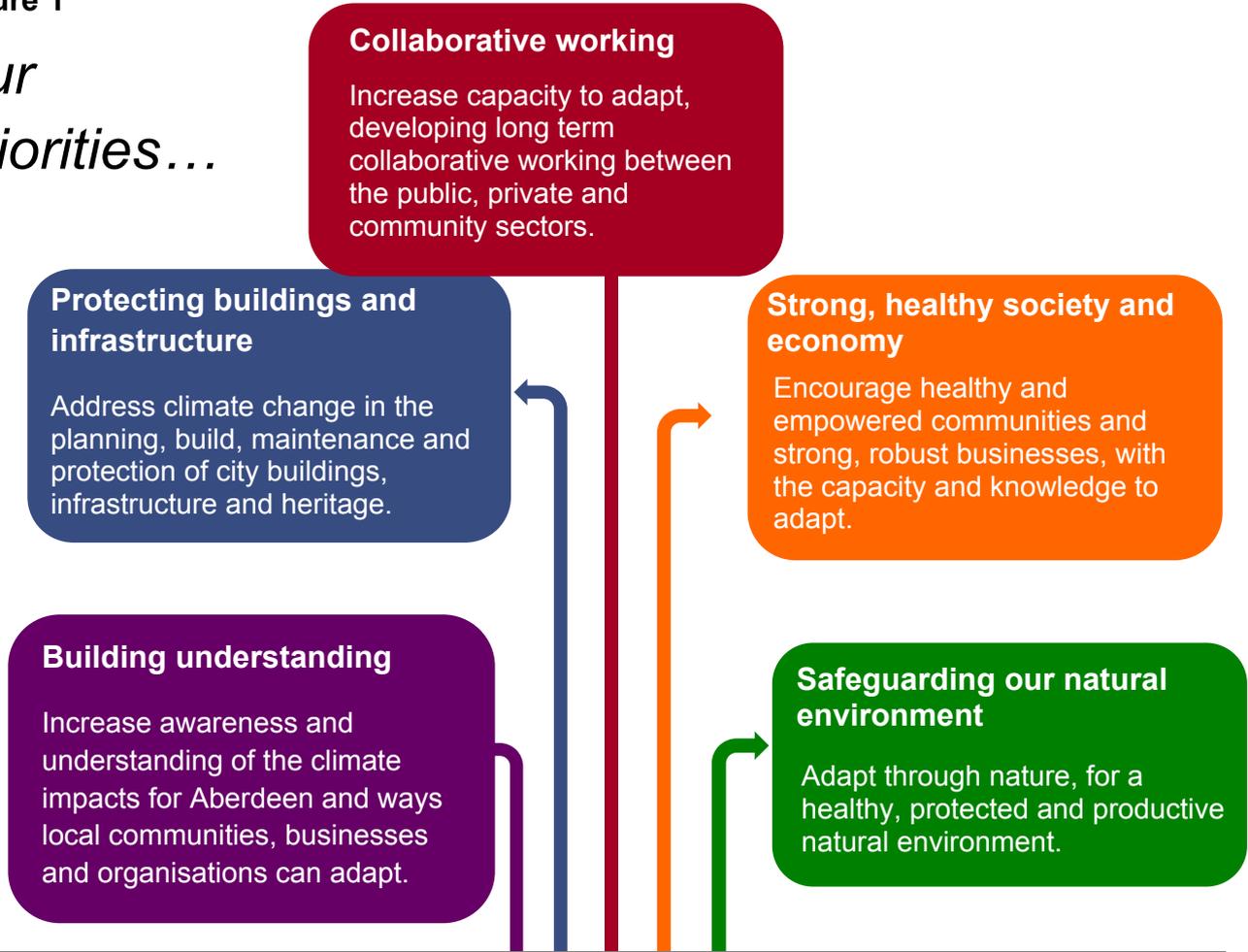
### ► Adaptation Action Areas

To help meet each of these goals, action areas for partnership working set out how Aberdeen will adapt. These actions identify ways to strengthen city resilience to climate change and build on the local adaptation measures that are already in place and delivering multiple benefits for Aberdeen.

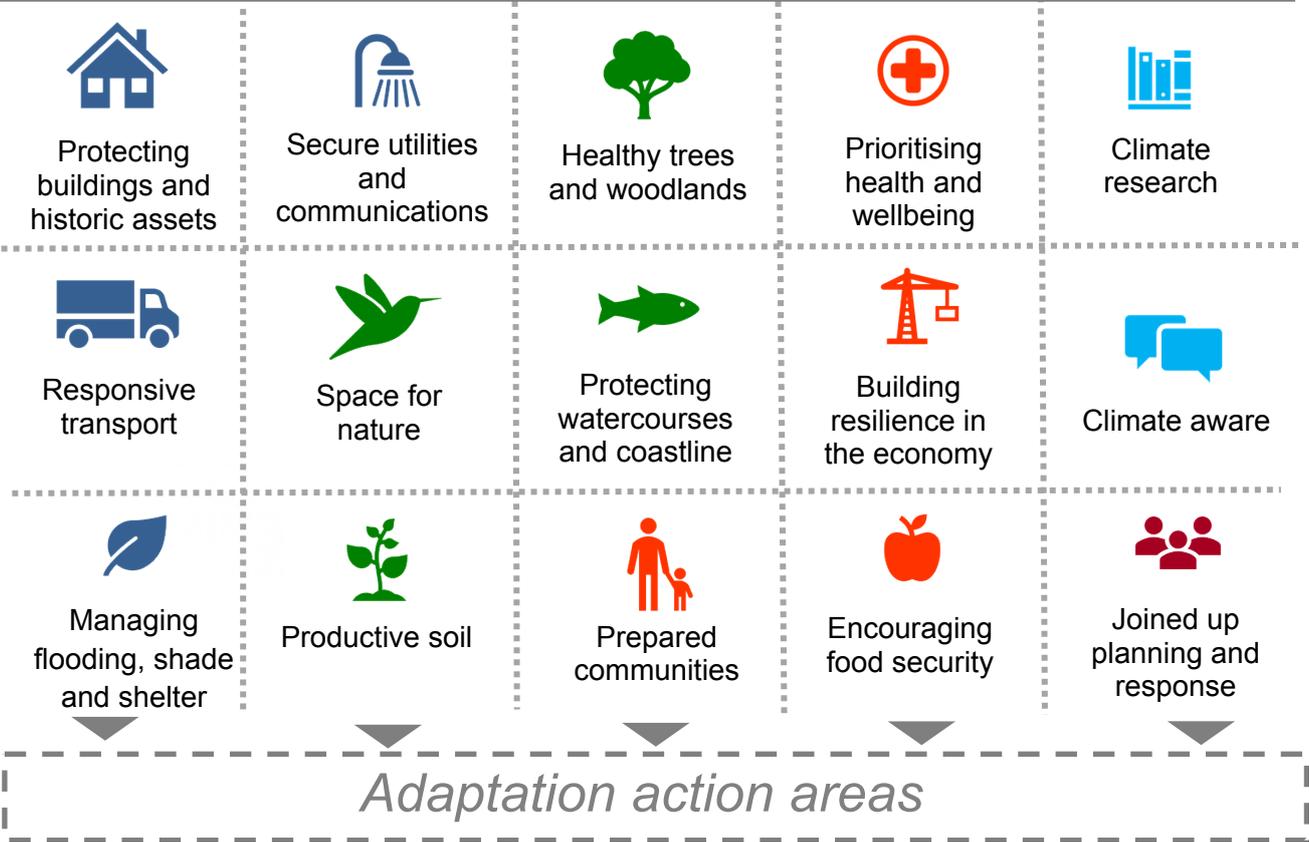
The approach is outlined in Figure 1.

Figure 1

# Our Priorities...



## Our Goals by 2050...



# Making it happen

Climate change isn't a challenge affecting one organisation or sector alone. With so many interdependencies, joint working on adaptation between organisations, businesses, communities, neighbouring local authorities, research and education institutes will be vital to keep the city safe, operating and ready for business in the long term.

Feedback from stakeholders and through the public consultation for Aberdeen Adapts highlighted a strong preference for linking governance on city-wide action to reduce emissions, with the approach for adaptation. Expressing a need for strong leadership on climate change.

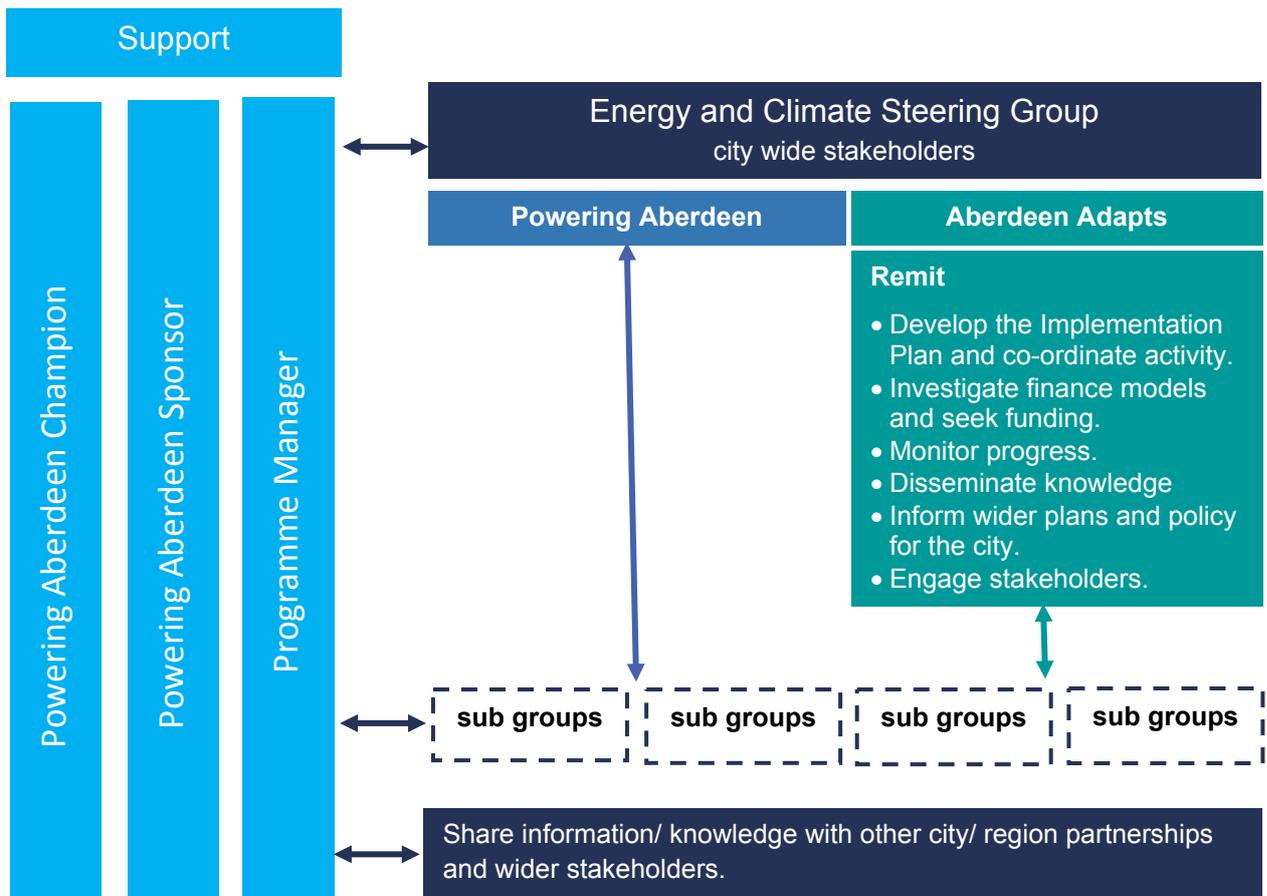
Taking this on board, governance for Aberdeen Adapts will be integrated with steering group arrangements for Powering Aberdeen, see Figure 2, under an Energy and Climate Programme\*:

**Aberdeen Adapts will act as a platform for collaborative action on adaptation, monitoring activity, identifying links and gaps and driving forward appropriate activity, specific sub-groups to progress actions will be set up as required.**

## Benefits

- **Oversight of climate change activity** in Aberdeen, reviewing progress, the effectiveness of actions and identifying gaps in activity and contingency planning.
- **Provide one place for contact** – for organisations that wish to get involved, as a single point to report on delivery of climate actions.
- **Improved use of resources** – there are many shared stakeholders in the two work streams, this would allow better use of stakeholder time and avoid duplication.
- **Realise any synergies** between the two programmes.
- **Reach out to any wider networks and partnerships.**

Figure 2



*\*Flexible governance arrangements will allow for adjustments to the Energy and Climate Programme as required by any changes to legislation, targets, emission scenarios, resources etc*

## Delivering Aberdeen Adapts

- Aberdeen Adapts is a long-term framework and it will be vital to review and adjust adaptation actions as more information becomes available or where any changes arise.
- Because of this an **Implementation Programme** for Aberdeen Adapts will be produced in 2020 and updated every 5 years to prioritise, phased measurable partnership actions to work towards these goals.
- The Implementation Programme will allow actions to be prioritised taking into account factors such as available resources, need, feasibility, cost and co-benefits.



## Funding actions

Early action to adapt to climate change will allow time to plan ahead to avoid costs through informed decision making and to allow time to develop low or no cost actions that can benefit wider city outcomes.

For some adaptation actions, seeking appropriate sources of funding can help to protect people and assets and save money in the long term. This could include costs for research and studies; for developing and implementing adaptation measures, such as building and infrastructure retrofit; or to help monitor change and the effectiveness of adaptation actions.

A range of funding opportunities have been identified that could be accessed to support adaptation. Where required, Aberdeen Adapts Steering Group will investigate funding routes appropriate for individual actions, such as grants and external funding, collaborative working, national subsidies and support packages, capital investment programmes and crowd funding.

## Monitoring

As Aberdeen Adapts gets underway, monitoring will allow the learning from actions to be captured, evidenced and assessed. This information can inform decision making and any wider roll out and mainstreaming of adaptation activity.

Monitoring will also help to assess any change in vulnerability in the city, such as changes in rainfall to see how it is affecting Aberdeen and to help make sure the implementation actions are appropriately targeted.

A mix of initial qualitative and quantitative indicators to support monitoring of Aberdeen Adapts are set out in the action summary *Appendix 1*. Further indicators will be developed to track shorter term actions under the Implementation Programme, building on those already in place across existing plans and policy.

## Review

Aberdeen Adapts will be reviewed every five years to ensure the framework is on track and aligned with new information including updates to climate projections, climate trends and climate risks for the region and will be updated where there are material changes.

Where any project to implement Aberdeen Adapts could have an impact on Natura 2000 sites, then an Appropriate Assessment, as per the EU Habitats Directive may be required.

Priority

# **Protecting buildings and infrastructure**

# Goal 1 - Protecting buildings and historic assets



Planning for change, flexible design and timely maintenance will help to keep Aberdeen's buildings resilient, people safe and insurance costs low. The Granite City's character and much-loved heritage will be preserved and protected for the benefit of future generations, through subtle changes to the care and management of buildings and historic sites.

## Adapting Aberdeen:

- ▶ Encourage uptake of risk assessments and resilience audits to help partners assess the impact from increases in severe weather events, such as heavy downpours, flooding, high winds and heatwaves. Building local links to sector actions planned under the National Adaptation Programme.
- ▶ With 32% of city buildings built before 1945, many of Aberdeen's buildings were designed for a different climate. Where building upgrade and regeneration is taking place, opportunities to retrofit adaptation, over time can help to protect premises.
- ▶ Continue to review and strengthen local plans and policies, as we learn more about how the climate will affect city buildings and their surroundings. To meet strategic growth plans it will be vital to plan for warmer temperatures and changes in rainfall. Damage and costs in the long term can be reduced or prevented, by taking future climate into account at the design stage.

- Considering building location, ground conditions and orientation.
- Reducing energy and water use.
- Using materials resilient to a changing climate.
- Considering whole life costs.
- Integrating green infrastructure (Goal 4)

- ▶ Develop local skills and knowledge in adapting buildings. Identify ways to adapt city heritage, in a sympathetic way

### Provide information on:

- Ways to incorporate adaptation into new development and building upgrades.
- The benefits of green space and permeable surfaces around buildings, to absorb rainfall and reduce flood risk.
- The simple measures that can be taken, from property protection to responsive maintenance, to reduce damage to buildings from water penetration, flooding and storms.

and address skills gaps in the care and repair of traditional buildings, to help conserve local history without loss of character. Aberdeen's heritage has already stood the test of time and with proper maintenance and adaptive management historic assets can be cornerstones of resilience.

**Adaptation example:** Aberdeen City Council's, Property Level Protection grant scheme helps private residents to purchase flood protection, such as flood guards. Eligible are those that have been flooded, or are in an area identified on the Scottish Environment Protection Agency (SEPA) Flood Maps as potentially vulnerable to flooding.

## Adaptation action areas

### Action 1.1

**Assess the vulnerability of Aberdeen's buildings and heritage to climate change and identify retrofit opportunities to increase resilience for those at risk.**

### Action 1.2

**Embed climate adaptation in planning, design and policy for resilience in new build.**

### Action 1.3

**Inform designers, developers, planners, asset managers and home owners on ways to adapt Aberdeen's built environment and encourage uptake of property protection.**

### Action 1.4

**Support skills development in adapting buildings; and in the care and protection of traditional buildings and assets.**

- ▶ Refer to appropriate guidance on adapting historic buildings including Historic Environment Scotland's Climate Change Impacts Guide for the Historic Environment

# Goal 2 - Responsive transport and infrastructure

Close collaboration between agencies, long-term planning and regular investment in resilient local transport infrastructure resilient to shocks from severe weather helping businesses stay active. Along Aberdeen's coastline better understanding of the dynamics of soft coastal areas and well adapted coastal defences will improve resilience.



Resilience is already included in work under the Local and Regional Transport Strategies. Collaboration will be crucial to meet the challenges from severe weather on routes around, into and out of Aberdeen.

### Adapting Aberdeen:

- ▶ The age of much of the existing transport network means it will be important to assess the vulnerability of local travel networks to climate change. Such as, attention to the risk of landslip where there are steep gradients on road and rail verges.
- ▶ Continue regular inspection, to identify issues early and to limit or prevent damage to local travel infrastructure. Monitoring for change in maintenance demands and costs.
- ▶ As part of wider travel planning, increase travel options and links to different modes of transport to assist travel during and following severe weather.
- ▶ Ensure design and specifications for transport infrastructure are robust to future rain and heat levels.
- ▶ Where practical, improve drainage and reduce flood risk through the use of permeable and porous ground surfaces.
- ▶ Develop sustainable water management solutions, such as grey and green sustainable urban drainage systems (SUDs) and swales to reduce run off and help manage pollution.
- ▶ Opportunities for home and remote working to improve safety and business continuity in severe

weather.

- ▶ Digital solutions to support travel planning, creating smarter travel options, that help to inform people's journeys during severe weather.

***Adaptation example: Smart journey, a joint city and shire project, has enabled interactive and immediate traffic updates through phone or computer.***

Scotland's Dynamic Coastal map and the assessment of coastal protection under the North East Flood Risk Management Plan have identified areas along the shoreline potentially vulnerable to future flooding and erosion. Local planning policy covers coastal protection.

### Adapting Aberdeen:

- ▶ Maintain Aberdeen's coastal defences, monitoring for change and strengthening protection, where and when required from flooding and erosion. Studies including the North Beach Coastal Protection are informing coastal management and protection plans.
- ▶ Protect and enhance the natural environment and local heritage along the shoreline.
- ▶ Collaborate with Aberdeenshire and key coastal partners to build understanding, inform decision making and help coastal areas to adapt. Supporting the delivery of the Integrated Coastal Zone Management.

## Adaptation action areas

### Action 2.1

**Build climate resilience into the design, planning, upgrade maintenance and management of local transport networks.**

### Action 2.2

**Use technology, to develop remote working opportunities and ways to better inform travel.**

### Action 2.3

**Develop a shoreline management plan, building on existing studies, to protect people, places, nature and heritage at the coast.**



## Goal 3 – Managing flooding, shade and shelter

Developing nature-based solutions in Aberdeen, such as green roofs, walls and raingardens will capture rainfall, provide shade and shelter, as well as creating new spaces for people and wildlife. Building greenspace and leisure areas into necessary flood defences to create healthy, attractive places for part of the year and provide an effective defence against the elements when required.

Partnership to manage flooding has mapped local areas potentially vulnerable to flooding. Priority measures for Aberdeen have been identified under the North East Flood Risk Management Plan and a range of city schemes are already in place and being developed to help manage flood risk. Continued progress with work under the plan will help manage current and future flood risk in Aberdeen.

### Adapting Aberdeen:

- ▶ Promote current and planned flood protection measures, their role and the benefits they bring.
- ▶ Encourage uptake of grey and green sustainable urban drainage systems (SUDs), swales and raingardens to manage run off during heavy rainfall.

### Developing blue-green infrastructure

With the right designs, in the right location; and where maintenance and ownership is addressed, blue-green infrastructure can become an essential and cost effective part of city infrastructure.

It can absorb rainfall and reduce flood risk. Provide cooling, shade and shelter. Help to improve air quality, reduce pollution and capture and store carbon.

It can support wildlife and connect habitats. Create space for leisure and recreation and contribute to health and wellbeing.

### Adapting Aberdeen:

- ▶ Test and mainstream blue-green infrastructure to help to adapt the Granite City. De-culverting the burn in Middlefield; establishing a more naturalised

meandering water course and wetland areas in the East Tullos Burn; and flood alleviation project at Maidencraig are local examples of blue-green infrastructure.

- ▶ Learn what works for Aberdeen’s climate and landscape; and sharing good practice.
- ▶ Create guidelines for blue-green infrastructure, to inform building

***Adaptation examples:** A small number of green roofs are starting to emerge locally. These can reduce run off from rainfall, have insulation and cooling properties, as well as additional benefits in increasing biodiversity. A green roof at the refurbished Pet’s Corner, Hazlehead Park; 3 curved sedum clad roofs at the Seaton Energy Centre; and roofs clad in red sedum at city sustainable Exhibition and Conference Centre, P & J Live.*

design and regeneration.

### Types of blue-green infrastructure

Green roofs and green walls in the design of city buildings. Sustainable urban drainage systems and natural flood management. Incorporating porous and permeable surfaces. Protected and enhanced greenspace networks. Multifunctional greenspaces such as parks and gardens. Planting trees and vegetation for shade and shelter. Space for water to ebb and flow through deculverting, wetlands and flood alleviation areas.

## Adaptation action areas

### Action 3.1

**Support measures to implement the North East Flood Risk Management Plan and identify city opportunities for natural flood management.**

### Action 3.2

**Expand the use of blue-green infrastructure in new development and regeneration.**



## Goal 4 - Secure utilities and communications

Collaboration, forward thinking and innovation will keep critical energy, water and communications secure, efficient and reliable. A resilient digital infrastructure in Aberdeen will establish smart solutions to monitor change and inform, allowing a more flexible and responsive approach to weather extremes.

### Adapting Aberdeen:

- ▶ Buildings in dense urban areas will feel much warmer, especially at night, because of the urban heat island effect. Using vegetation around buildings can provide shade and cooling helping to avoid energy demands from air conditioning as temperatures increase.
- ▶ Powering Aberdeen the city Sustainable Energy Action Plan aims to encourage a transition to alternative energy. With themes for increased share of alternative technologies, energy efficiency, resource efficiency, low emission technologies and leadership and behaviour change. Investigating opportunities and risks from temperature and rainfall change, to local energy systems will help to keep them productive and secure in the long term.
- ▶ With the River Dee supplying much of the domestic water for Aberdeen and Aberdeenshire, itself a protected river, it will be essential to conserve valuable water resources. Promote efficient water use during drier spells to reduce stress on water supply. Increase uptake of water efficiency appliances and fittings and the use of water saving technology, such as grey water recycling and rainwater harvesting in new development and regeneration.

- ▶ Aberdeen's Smart City ambitions can support resilience, using digital technology to explore innovative adaptation solutions. From the use of apps and sensors for early alert systems on severe weather and flooding; to ways to maintain connections, protect vital infrastructure, inform people and monitor the impacts of severe weather.
- ▶ Building resilience into Aberdeen's emerging digital infrastructure can help to protect smart city applications from weather shocks and stresses.

### Adaptation action areas

#### Action 4.1

**Promote natural solutions to the cooling and ventilation of buildings vulnerable to heat in Aberdeen.**

#### Action 4.2

**Assess climate opportunities and risks for Aberdeen's renewable energy infrastructure.**

#### Action 4.3

**Encourage sustainable water use in homes and businesses, to protect water quality and availability.**

#### Action 4.4

**Investigate opportunities to use technology to support adaptation in Aberdeen – through mapping, modelling and monitoring.**

Priority

# **Safeguarding our natural environment**



## Goal 5 – Space for nature

Monitoring of species numbers and habitat health will allow us to respond quickly to new challenges. By improving green space connections and increasing naturalised areas, local nature and wildlife has the space to adapt. Through a resilient approach the quality of Aberdeen’s parks and greenspaces is maintained and they are able to flourish when the weather is dry and manage rainfall when it is wet.

Aberdeen’s greenspaces can help to absorb rainfall, as well as provide shade and shelter during hotter weather, helping to regulate urban temperature while benefiting people’s health and wellbeing.

### Adapting Aberdeen:

- ▶ Encourage wildflower planting, urban greening and places for pollinators, making space for nature in urban areas from rooftops to verges. In doing so, improve habitat connections, to make space for nature and wildlife to adjust to a changing climate.
- ▶ Establish an evidence base and mechanisms for local changes to biodiversity.
- ▶ Support work to tackle invasive non-native species (INNS), such through the North East Invasive Non-Native species project and INNS Forum.
- ▶ Encourage citizen science initiatives to identify wildlife distribution and numbers in the city. Valuable data collection can support the work of the North East Scotland Biological Records Centre (NESBReC).
- ▶ Continue collaborative partnership work to protect local biodiversity, such as through the North East Scotland Biodiversity Partnership.
- ▶ Explore opportunities to further embed climate change in Aberdeen’s plans and strategies to reduce impacts on local wildlife and habitats.

- ▶ Warmer, drier weather can create conditions where wildfire can quickly take hold. Inform people how to take precautions to reduce the risk and spread of wildfire. Learning from the successful partnership work that has taken a proactive approach to address wilful fire raising at the Gramps.
- ▶ Sustainable management of these spaces can save on future maintenance demands as the growing season lengthens and rainfall and temperatures change.
- ▶ Raising awareness of ways to adapt vulnerable city greenspaces, including information on resilient gardens for city residents.
- ▶ Identifying plants robust to change and pests and disease.
- ▶ Exploring opportunities for

**Adaptation example:**  
*Work has taken place to develop Hazlehead Park as a Climate Change Park. Alongside emission reduction measures, long term adaptation actions are planned, covering the management of the park, the planting schemes, drainage, building management and maintenance of the park. There was community involvement throughout this process and a community park group formed to oversee the management of the park.*

rainwater capture to help Aberdeen’s horticulture to flourish during dry spells.

- ▶ Encourage uptake of Environmental Enhancements Net Gain to increase biodiversity in development

## Adaptation action areas

### Action 5.1

**Assess the vulnerability of Aberdeen’s natural environment to climate change and establish processes to monitor change.**

### Action 5.2

**Review and strengthen local plans, policy and strategy, as we learn more about climate impacts for the natural environment.**

### Action 5.3

**Protect and expand Aberdeen’s Green Space Network and increase naturalised green spaces in the city, to improve habitat connections.**

### Action 5.4

**Promote partnership action to reduce the risk of wildfire.**

### Action 5.5

**Integrate climate resilience in the management of Aberdeen’s parks, gardens and greenspaces.**

## Goal 6 - Productive soils

Our soils will be healthy and productive, providing effective drainage, as well as supporting food production and the health of our natural environment. As the growing season extends, safeguarding Aberdeen’s soils will bring benefits for nature and local growing.



As Aberdeen expands in future years, there will be competition for land use and greater challenges to soil.

The [State of Scotland's Soil](#) ranks climate change as the greatest aggregated pressure on soils. Taking action can help to protect soil function, so it can continue to absorb rainfall, support biodiversity and food growing. Healthy soil is an important store of carbon, because of this the Aberdeen Local Development Plan includes the need to retain soil carbon.

#### **Adapting Aberdeen:**

- ▶ Review and strengthen protection for soils in plans and policy. Promoting sustainable soil management in city development and construction.
- ▶ Encourage the sustainable development of brownfield sites in Aberdeen, where appropriate, to help to reduce soil compaction. While recognising that brownfield sites can often provide valuable habitats and function in urban environments.
- ▶ Increase the use of porous and permeable ground surfaces in new development and regeneration. This will allow soils to soak up and filter rainfall and pollutants; helping to reduce flood risk and water run off.
- ▶ Increase understanding of the need to retain permeable surfaces in Aberdeen to reduce risks of surface water flooding.
- ▶ Create good practice guidance and information on ways to improve soil management, for developers, land managers and those involved in food growing in the city.

- ▶ Build awareness of the importance of soil and the risks of soil pollution to health.

## Adaptation action areas

### Action 6.1

**Encourage management and protection for soil during planning, development and construction processes, to maintain soil function, quality and stability.**

## Goal 7 - Healthy trees and woodlands

Monitoring, management and strategic plans for Aberdeen's trees and woodlands will make sure tree health is maintained and growth is protected and promoted. Expanding city tree coverage, with the right tree in the right place, will help to keep Aberdeen resilient and liveable.



Aberdeen's trees and woodlands have the ability to play a huge role in adapting to climate change but we need to learn more.

### Adapting Aberdeen:

- ▶ Monitoring to improve understanding of the extent of city tree cover, the condition of city trees and woodlands and their value in resilience.
- ▶ Vigilance will be essential to spot any changes to tree health from warmer, wetter weather, including early detection of pests and disease. Identifying damage and decline from increases in wetter, stormy weather. Stresses from hotter, drier spells; and any impact on tree health and growth, as the growing season lengthens.
- ▶ Planting has already expanded the Granite City Forest. By planning ahead with a strategic approach to city trees and woodlands, we can ensure there is sufficient tree cover in Aberdeen to help to absorb carbon, contribute to clean air, while bringing many wider benefits for health and wellbeing.
- ▶ Aberdeen Adapts will work collaboratively to encourage resilience and diversity in new tree planting. Ensuring new trees planted are robust to warmer, drier summer weather, waterlogged winters and longer growing seasons.
- ▶ It will be important to build understanding of the importance of city trees and woodlands in building city

resilience.

- ▶ Trees and woodland areas in and around Aberdeen can reduce flood risk, slowing down run off during wetter weather. They can help to stabilise soils reducing the risk of erosion. Increase uptake of measures such as wet woodland in river catchments and the use of riparian woodland buffers.
- ▶ Explore the use of tree pits under street trees to provide temporary storage for rainfall during heavy downpours and reduce the risk of surface water flooding.
- ▶ Planning green corridors can provide leafy connections for wildlife, as well as shelter, shade and cooling, as temperatures rise. Examine opportunities to plant trees for shade and shelter to enhance active travel routes.

#### **Adaptation examples:**

*Aberdeen City Council co-ordinated planting of 210,000 native trees in the city (2010-12) as part of the Tree for every Citizen initiative. Creating around 100 hectares of accessible new woodland.*

*The Dee Catchment Partnership and the River Dee Trust have also co-ordinated tree planting efforts to help to stabilise river banks along the Dee corridor and help to reduce flood risk and erosion downstream.*

## Adaptation action areas

### Action 7.1

**Establish a programme to assess tree cover in Aberdeen and monitor the health of city trees and woodlands.**

### Action 7.2

**Expand Aberdeen's tree coverage, planting resilient species at appropriate locations.**

### Action 7.3

**Explore the use of trees and woodlands to reduce flood risk and provide shade and shelter in Aberdeen.**



## Goal 8 - Protecting watercourses and coastline

Our rivers, streams and burns will remain healthy, natural resources, with excellent water quality sustaining a diverse range of species. Aberdeen's dynamic coastline will adapt to coastal change.

Maintaining catchment management with key partners will be essential to conserve and improve watercourses during peak and low flows. The River's Dee and Don form an important part of the local landscape and strong catchment planning can help protect water quality and quantity, as well as reduce impacts from temperature, flooding and pollution on aquatic life.

### Adapting Aberdeen:

- ▶ Build understanding of the climate impacts on Aberdeen's coastal landscape and how to work with dynamic natural processes to address risks to coastal habitats and wildlife.
- ▶ Investigate opportunities to incorporate measures such as, beach nourishment and dune restoration into plans to protect the city shoreline.
- ▶ Through monitoring to identify changes in health, distribution and numbers of marine mammals and coastal birds.
- ▶ Work in collaboration with Aberdeenshire and wider partners, to support a healthy and safe coastline, able to naturally adapt to coastal change.
- ▶ Where appropriate: create space for water to ebb and flow during the seasons to reduce the risk of flooding. Through flood plains, wetlands, de-culverting and buffer zones, local rivers will have space to adapt, protecting people and places.

- ▶ Protect river banks, by planting trees and vegetation and using natural protection techniques such as willow spiling, so they are less vulnerable to erosion.

### Adaptation examples:

*A River Basin Management Plan is addressing pressures on the condition of the water environment, water quality and quantity.*

*Collaborative working through the Dee Catchment Partnership is working to protect and improve the waters of the Dee Catchment.*

## Adaptation action areas

### Action 8.1

**Support the development of natural coastal defences, to improve the resilience of vulnerable soft coastal areas to flooding and erosion.**

### Action 8.2

**Investigate opportunities to re-introduce meanders to watercourses, where appropriate, to slow down water flow.**

### Action 8.3

**Encourage sustainable river bank management to reduce erosion.**

Priority

# **Strong, healthy society and economy**

## Goal 9 - Prepared communities



Informed communities, aware of their options will be prepared for severe weather. Community and remote working hubs will become centres of community activity, providing safe places and a connection with local services. These connected communities will know each other better and naturally band together when challenges arise.

Climate change can widen inequalities, such as being unable to afford insurance or adaptation measures. It can affect existing health issues.

### Adapting Aberdeen:

- ▶ Assess where people may be vulnerable to climate change and develop actions to help people prepare and respond.
- ▶ Highlight resources and information sources so local people know how to keep safe and are aware of the assistance available during and following severe weather.
- ▶ Increase awareness of the Local Resilience arrangements already in place to support response and recovery in emergency situations.
- ▶ Work with communities to create opportunities for those that would like to be involved. Communities understand their local area and are well placed to spot any changes such as water leaks and flooding. Local tree planting and in some areas, volunteer work as Flood Wardens are examples of ways that people in Aberdeen have already contributed to resilience.
- ▶ Support and coaching will help local communities to take the steps to develop the community resilience plans for their area, that will make it easier for people to cope with and recover from severe weather. A [City Voice survey](#) indicated: 65% of Aberdeen's citizens considered they could be relied on by their community to provide support.

### Adaptation examples:

*Seaton Park, was affected by flooding during Storm Frank. Most of the park was under two metres or more of water at the peak of the flooding and remained under water for several weeks. This affected the sports pitches, informal recreation areas and the formal gardens. Hundreds of volunteers from Friends of Seaton Park and the local community turned out to work with the council staff to clean up the park and the debris left by the floods, to get it back to its former condition. These efforts achieved a RHS Award for Overcoming Adversity.*

*The Culter Community Resilience Plan is an example, where a community in Aberdeen has identified self-help arrangements that are able to complement the response from emergency services in a flooding or storm situation. The plan has allowed the community to prepare for extreme weather events, helping to minimise impacts and disruption. They have increased understanding of the local risks and identified local resources, support and key safe locations in case of severe weather.*

## Adaptation action areas

### Action 9.1

Use [Climate Just](#) mapping to target action and reduce the risk of communities being disadvantaged in being able to prepare and respond to climate change.

### Action 9.2

Develop a platform of support, information and learning, to build community capacity to prepare for severe weather.

### Action 9.3

Work with Community Planning Partners and local communities to increase the number of community resilience plans in place in Aberdeen.



## Goal 10 - Prioritising health and wellbeing

New leisure spaces created by natural flood management schemes, protected parks and active travel networks will contribute to improving the health of the city. The changing climate will continue to create risks, but strong partnerships between healthcare providers and city officials will mean they are prepared for impacts on health, facilities and can provide a ready response to health outbreaks.

Climate Ready Scotland, the National Adaptation Programme highlights a number of policies to ensure health and social care is ready for a changing climate. Aberdeen's health and social care services and facilities must be informed and ready to respond to ensure essential care is not affected by wetter winters and warmer summers.

### Adapting Aberdeen:

- ▶ Cascade information on any health impacts from climate change that could affect the city: such as increases in damp and air pollution that could affect people with respiratory illness; or from flooding that could affect people's physical or mental health.
- ▶ Build understanding on the risks of overheating, especially within city health and social care facilities.
- ▶ Increase awareness of the benefits of safeguarding the natural environment actions for health. Studies show the links between greenspace and health and wellbeing.

### Adaptation examples:

*Greening the NHS is a programme exploring options to use the natural environment at NHS estates to bring health benefits.*

*Aberdeen Royal Infirmary Family Therapeutic Roof Garden is providing valuable green space that is improving health and wellbeing.*

- ▶ Recognise that health and well-being outcomes are firmly linked with the success of actions for buildings and infrastructure. Around 26% of people aged 65 years and over in the city, with high care needs are cared for at home.
- ▶ Encourage project partners to build climate risks into existing contingency planning to reduce impacts from flooding, storms and heat, on health and social care facilities and to patient transport.
- ▶ Support action to improve air quality in Aberdeen's Air Quality Management Zones, through the Air Quality Management Plan. We will need to learn more about how climate change will affect city air quality

## Adaptation action areas

### Action 10.1

**Inform health and social care providers on climate impacts for Aberdeen, to support local adaptation in this sector.**

### Action 10.2

**Embed climate change in health and social care planning and in business continuity arrangements.**

### Action 10.3

**Support ongoing monitoring and actions to improve city air quality and measures to integrate climate risk in air quality planning.**



## Goal 11 – Building resilience in the economy

By working together Aberdeen's businesses will have taken steps to climate proof their business and supply chains. Transferrable skills from other industries could be redirected into creating new solutions to climate challenges. By seizing new economic opportunities, a resilient Aberdeen will be attractive for investors and well placed for business growth.

### Adaptation action areas

#### Action 11.1

**Build understanding of the impact of climate change on key city business sectors; and encourage and support the development of business resilience plans.**

#### Action 11.2

**Investigate options for business growth from the adaptation sector; including through innovation, technology and skills development.**

Forward planning can help boost the resilience of Aberdeen's businesses to the shocks and stresses from storms, flooding and high temperatures. This can save on costs from business disruption and damage to premises. Such as diversifying supply chains, to get ready for times when products and raw materials may be scarcer or prices more expensive. A growing global market for resilience products and services could offer businesses with the right skill sets, the chance to diversify into the green economy. Embracing opportunities from a growing market for resilience products and services adaptation can support objectives in the *Regional Economic Strategy* for investment in infrastructure, innovation, inclusive economic growth and internationalism.

#### **Adapting Aberdeen:**

- ▶ Encourage uptake of business resilience planning, signposting to information on the local challenges and opportunities of climate change and resources to support business resilience.
- ▶ Promote flexible working and investigate opportunities to enhance remote working under *Goal 2* can help keep city

businesses open and staff safe, during and after severe weather.

- ▶ Examine risks to key business sectors
- ▶ Work collaboratively with Aberdeenshire to progress action on economic opportunities and threats from climate change. A changing climate may mean opportunities, as well as challenges in sectors such as agriculture and tourism.

#### **Adaptation examples:**

*The Low Carbon Resilient Cities Review for Scottish Cities (2016) looked at the economic risks and opportunities from climate change. This work encompassed specific studies for all 7 cities in Scotland including Aberdeen.*

However, the success of adaptation for these sectors will be dependent on action to address adaptation goals for buildings, infrastructure, food security, space for nature, water and soils.

In addition, goals for green infrastructure, can help create attractive places that encourage investment.



## Goal 12 - Encouraging food security

People will have access to safe, healthy and affordable food. An increasing amount of food will be produced locally, with green-fingered residents linking up with greenspace managers to share resources and expertise. Markets and food hubs will create a link for producers across the north east to sell their goods, in turn these shorter supply lines support resilience.

### Adapting Aberdeen:

- ▶ Severe weather can disrupt supply chains, with damage to produce, increased prices or delays in the distribution of goods. With around 22,000 people employed in the food and drink sector in the north east of Scotland, and with regional aims to grow the food and drink sector by 5% per annum it is vital to build resilience in food production and supply chains.
- ▶ As warmer weather extends the growing season, there could be new opportunities for the home grower and food businesses. Offering opportunities to retain and possibilities to grow skilled employment in this sector. Providing information on ways climate change can be addressed in local food growing businesses and infrastructure, can help to support food security.

#### **Adaptation example:**

- *Adaptation has been considered in Granite City Growing, a proposed strategy developing opportunities for community food growing in Aberdeen.*
- *Nether Loirston allotments at Cove make use of rainwater capture from adjacent buildings to provide a water source to keep plants healthy during dry spells.*

- ▶ Aberdeen Adapts supports Granite City Good Food and opportunities to increase local food growing and sharing. Adapting Aberdeen's growing sites, whether existing or new food growing spaces, will help

them to remain productive and accessible in the future.

Measures including:

- ▶ Improve drainage, permeable surfaces, windbreaks, raised beds and effective soil management.
- ▶ Increase use of rainwater collection and storage systems to improve water security during periods of warm weather and drought.
- ▶ Build understanding about climate impacts on local food crops, trialling different times for planting and a wider range of varieties and types of crop.
- ▶ Explore opportunities to link food growing to the development of green infrastructure (*Goal 3*), by using vertical and roof spaces for food growing in Aberdeen.
- ▶ Raise awareness of the potential risks of climate change on food standards and quality; and promote food safety.

### Adaptation action areas

#### Action 12.1

**Build understanding of risks to the food sector and opportunities to build resilience.**

#### Action 12.2

**Incorporate climate adaptation measures in new and existing food growing sites.**

Priority

# Building understanding

**23%**

Public in Aberdeen indicated they had taken steps to protect their home against severe weather. With measures including checking and replacing roof tiles; and clearing drainage ditches.

City Voice Survey 43

**37.3%**

Public in Aberdeen agreed or strongly agreed that they knew where to find resources to prepare for severe weather events.

City Voice Survey 43



## Goal 13 - Climate research

Aberdeen's education and research institutions will pursue cutting edge climate research and technologies to become an adaptation research and development hub. As the climate continues to adjust, this research will help to identify the future challenges and provide information on the tools to take effective early action.

### **Adaptation examples:**

- *Students at the University of Aberdeen provided valuable input to the development of Aberdeen Adapts, working on projects covering partnership research, community resilience and severe weather impacts.*
- *Aberdeen Adapts has already gained insight from the experiences of implementing adaptation, learning from work underway through Climate Ready Clyde and Edinburgh Adapts.*

### Adaptation action areas

#### **Action 13.1**

**Encourage research programmes to address adaptation gaps and build knowledge of adaptation measures that work for Aberdeen.**

#### **Action 13.2**

**Develop adaptation partnership training and placement opportunities for students.**

#### **Action 13.3**

**Encourage project partners and volunteers through citizen science projects, to gather data on weather impacts and the local environment.**

#### **Action 13.4**

**Learn from successful research and projects in other cities and regions and apply lesson learned to adaptation in Aberdeen.**

Make use of the knowledge and expertise between institutions including; University of Aberdeen, RGU and James Hutton Institute.

**Adapting Aberdeen:**

- ▶ Seek opportunities for co-operation and joint initiatives, to make use of the knowledge and to link gaps in adaptation knowledge with opportunities for local learning.
- ▶ Test local research in adaptation with cost effective, relevant, practical demonstration projects. Helping to narrow the gap between adaptation research, local policy and practicalities.
- ▶ Remain flexible to adjust Aberdeen's adaptation processes to the findings of new research and information.
- ▶ Learn from successful research and projects in other cities and regions and apply lesson learned to adaptation in Aberdeen.
- ▶ Aberdeen Adapts will consider options for student projects, placements, training and internships.
- ▶ Local observers are well placed to notice changes in their surroundings. Community input, through citizen science projects will help to improve the range and quantity of data gathered to support adaptation in Aberdeen.



## Goal 14 – Climate aware

A clear communication strategy will engage local people, build understanding of climate change and the benefits of adaptation. Information on successful action will be shared with local, national and international partners, to raise the profile of the city.

### Adapting Aberdeen:

- ▶ Develop and implement an Aberdeen Adapts communication plan to help people understand the impacts of climate change for Aberdeen and what sectors can do to prepare. From information, on where to go for assistance when severe weather hits; to getting people on board with the multiple benefits of local adaptation action.
- ▶ Build shared understanding among Aberdeen Adapts networks, decision makers and local communities. Providing the means for a 2 way exchange of information on adaptation.
- ▶ Involve young people in Aberdeen's adaptation journey, by promoting local learning linked to the Curriculum for Excellence, such as the EcoSchools programme and Climate Ready Place and Flood Education lesson plans.
- ▶ Promote good practice and produce case study examples of successful local adaptation activity.
- ▶ Link adaptation awareness to local events and initiatives, such as the North East Climate Week.
- ▶ Explore opportunities to use art and cultural reflections to improve understanding of climate change and to encourage climate action.
- ▶ Provide direction to available adaptation tools and resources

that may be of benefit to project partners.

#### Adaptation examples:

*An Arts and Climate Change event at Middlefield Community Hub explored ways to engage communities in climate change in a way that resonates with people. The project involved Adaptation Scotland, Creative Carbon Scotland, RGU and Aberdeen City Council.*

*Fernielea School took part in a 'Flood Awareness' Week, where pupils had the chance to learn about flood resilience. Following the week, 92% of the pupils stated they were more aware of the flood risks in their area and 80% of the pupils were more confident in knowing what to do in a flooding event.*

*Aberdeen Climate Action have carried out local awareness raising events and co-ordinate a North East Climate Week programme.*

### Adaptation action areas

#### Action 14.1

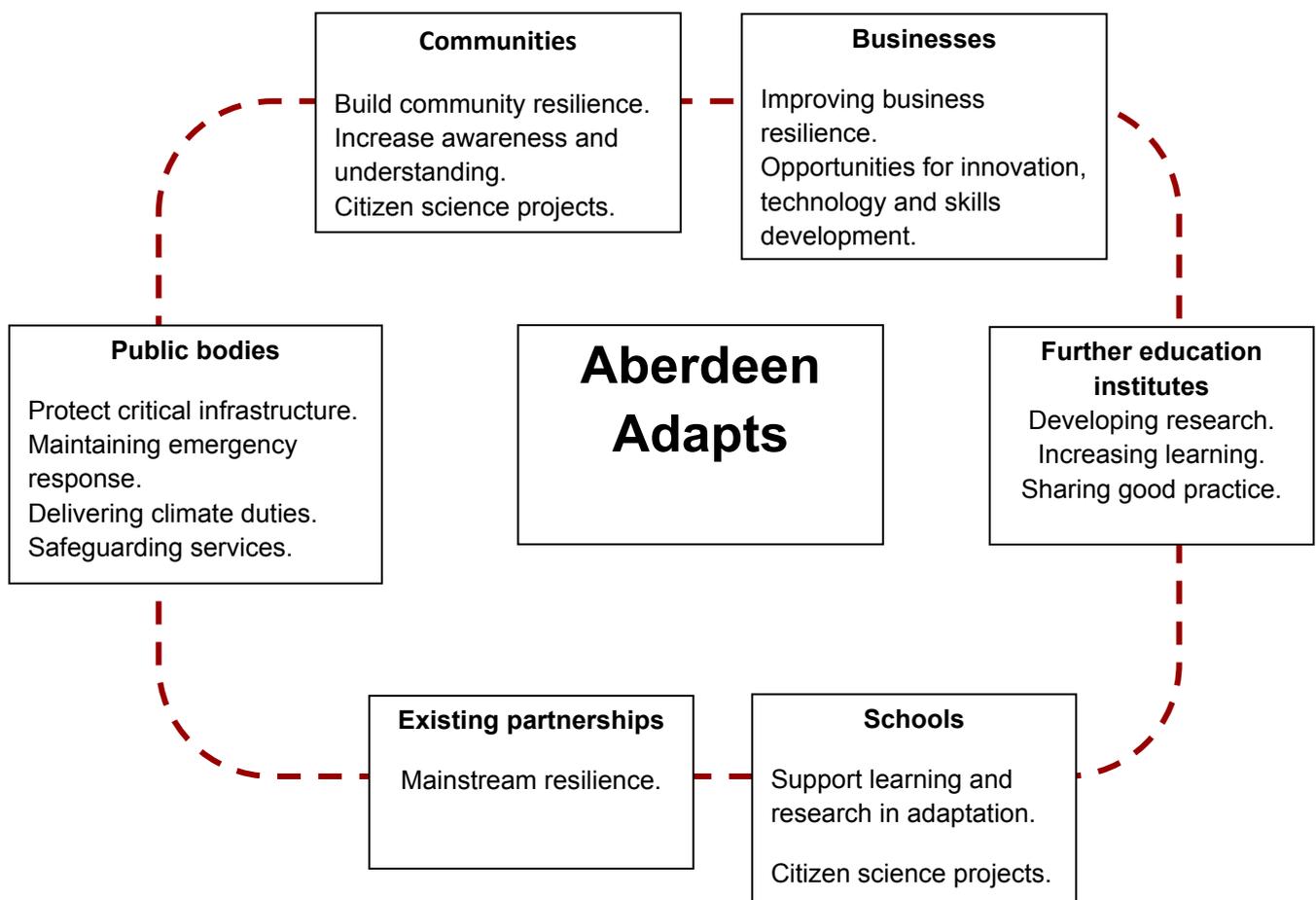
**Increase the engagement of local communities, businesses, schools and organisations through an adaptation education and information campaign.**

#### Action 14.2

**Establish a resource of information on climate risks, impacts actions for the city and wider region.**

# Priority Collaborative working

*Building on existing networks and encouraging involvement.*





## Goal 15 - Joined up planning and response

A partnership of public, private and third sector organisations will help to develop and monitor the city's adaptation plans, ensuring responses are balanced and efficient. The collaborative approach extends beyond traditional city boundaries, bringing together organisations across the north east.

### Adapting Aberdeen:

- ▶ Prepare, progress and monitor 5 year prioritised programmes of action to adapt, identifying those responsible for progress. This will allow action against climate risks and opportunities to be prioritised and resources directed to where action is needed.
- ▶ As part of this process, Aberdeen Adapts will investigate opportunities for learning from other cities, that have developed solutions to their own climate challenges.
- ▶ While Aberdeen Adapts has a city focus, there is a need to consider impacts for the region and it will be vital to liaise on this agenda. The city and shire are connected by coastline, and through the paths of the Rivers Don and the Dee and transport corridors. These links mean some climate impacts are shared.
- ▶ Support organisations participating in Aberdeen Adapts with assessing climate risks and identifying any pressures from climate change on business continuity arrangements. Ensuring partners are aware and prepared to respond and recover.
- ▶ Complete regular Weather Impact Reports to monitor the costs, impact on services and resources from storms, flooding and heatwave events.
- ▶ Support key city partnerships to protect the city. Investigating any additional pressures from climate change on planning

and arrangements for response and recovery through the Local Resilience Partnership and partnership working on flood management.

- ▶ Liaise with existing networks to

#### Adaptation examples:

*Aberdeen's Community Planning Partnership is delivering outcomes for community climate resilience under the Local Outcome Improvement Plan.*

*Partnership work led to the development of the North East Flood Risk Management Plan.*

*The Local Resilience Partnership provides multi agency co-ordination for response and recovery in emergency situations, including severe weather.*

strengthen emergency response.

### Adaptation action areas

#### Action 15.1

**Deliver, monitor and review the Aberdeen Adapts Implementation Programme.**

#### Action 15.2

**Embed climate adaptation into new and reviewed key city plans, programmes and strategies.**

#### Action 15.3

**Identify pressures from climate change on contingency planning. Continue to assess the impacts of severe weather on Aberdeen.**

#### Action 15.4

**Liaise with the Local Resilience Partnership to investigate any impacts from climate change on emergency response and recovery arrangements.**

## Glossary

### Abstraction

The removal of water from any source, either permanently or temporarily.

### **Adaptation**

The process of adjustment to actual or expected climate and its effects. In human systems, adaptation seeks to moderate or avoid harm or exploit beneficial opportunities.

### **Blue, green Infrastructure**

Green infrastructure covers a network of greenspaces and includes parks, playing fields, tree-lined streets, allotments, private gardens, river banks, wetlands and woodlands, as well as green roofs and artificial structures that include vegetation such as green walls, rain gardens and sustainable urban drainage systems. It can incorporate blue infrastructure including sustainable urban drainage, swales, wetlands, rivers and canals and their banks, and other water courses.

### **Bridge scour**

Movement of riverbed sediment, associated with fast flowing water against bridge with footings in the river bed, damaging the bridge foundations.

### **Climate change**

The Framework Convention on Climate Change (UNFCCC), defines climate change as: “a change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods.”

### **Culvert**

A culvert is a structure that allows water to flow under a road, railtrack, path, or similar obstruction from one side to the other side.

### **Fluvial flooding**

Flooding of rivers and waterways, accumulation of water over areas that are not normally submerged.

### **Groundwater flooding**

Rainfall increases natural water levels underground, this results in it rising to the surface causing flooding.

### **Invasive non-native species**

Those that have been transported outside their natural range and that damage the environment, economy, our health and the way we live.

### **Riparian woodland**

A wooded area of land adjacent to a water course.

### **Soil compaction**

Compressing soil particles, reducing space for air and water.

### **Soil sealing**

Covering soil in impermeable materials such as concrete or asphalt.

### **Storm surge**

Weather and tidal conditions increase sea levels which can lead to significant coastal inundation. A temporary increase in the height of the sea due to extreme meteorological conditions (low atmospheric pressure and/ or strong winds). Excess above the level expected from tidal variation alone at that time.

### **Surface water flooding**

Occurs when an extremely heavy downpour of rain saturates the urban drainage system and the excess water cannot be absorbed.

### **Sustainable Urban Drainage Systems (SUDS)**

Water management systems to drain

and manage water in a more sustainable way, lessening the risk of flooding by slowing down run off. The term SUDS can cover permeable surfaces, filter and infiltration trenches, swales; detention basins, raingardens, wetlands and ponds.

### **Swales**

Can refer to a natural landscape feature or one designed to manage water run-off.

### **Urban Heat Island Effect**

Defined as a city area significantly warmer than the rural surrounding area, the heat stored in buildings and the ground. The temperature difference is usually greater at night than during the day.

## Appendix 1 - Action summary

Priority – Buildings and Infrastructure	Indicators	
1.1 Assess the vulnerability of Aberdeen’s buildings and heritage to climate change and identify retrofit opportunities to increase resilience for those at risk.	<ul style="list-style-type: none"> <li>• Building condition and disrepair</li> <li>• Uptake of property level protection measure</li> <li>• Evidence of flood management measures</li> <li>• Number of recorded flooding incidents</li> <li>• Changes in the extent to flooding in relation to SEPA Flood Mapping.</li> <li>• Evidence of potential significant positive effects derived from appropriate retrofitting of traditional buildings and adapting heritage assets and sites.</li> </ul>	
1.2 Embed climate adaptation in planning, design and policy for resilience in new buildings.		
1.3 Inform designers, developers, planners, asset managers and home owners on ways to adapt Aberdeen’s built environment and encourage uptake of property protection.		
1.4 Support skills development in adapting buildings; and in the care and repair of traditional buildings and assets.		
2.1 Build climate resilience into the design, planning, upgrade, maintenance and management of local transport networks.		
2.2 Use technology, to develop remote working opportunities and ways to better inform travel.		
2.3 Develop a shoreline management plan, building on existing studies, to protect people, places, nature and heritage.		
3.1 Support measures to implement the North East Flood Risk Management Plan and identify city opportunities for natural flood management.		
3.2 Expand the use of blue-green infrastructure in new development and regeneration.		
4.1 Promote natural solutions to the cooling and ventilation of buildings vulnerable to heat in Aberdeen.		
4.2 Assess climate opportunities and risks for city renewable energy infrastructure.		
4.3 Encourage sustainable water use in homes and businesses, to protect water quality and availability.		
4.4 Investigate opportunities to use technology to support adaptation – through mapping, modelling and monitoring.		
<b>Priority – Safeguarding our environment</b>		<b>Indicators</b>
5.1 Assess the vulnerability of Aberdeen’s natural environment to climate change and establish processes to monitor change.		<ul style="list-style-type: none"> <li>• % increase in tree canopy cover</li> <li>• Number of days River Dee falls below Q95 low river flow.</li> <li>• % increase blue-green infrastructure</li> <li>• Number of SFRS hours responding</li> </ul>
5.2 Review and strengthen local plans, policy and strategy, as we learn more about climate impacts for the natural environment.		
5.3 Protect and expand Aberdeen’s Green Space Network and increase naturalised green spaces in the city, to improve habitat connections.		
5.4 Promote partnership action to reduce the risk of wildfire.		
5.5 Integrate climate resilience in the management of Aberdeen’s parks, gardens and greenspaces.		

6.1 Encourage management and protection for soil during planning, development and construction processes, to maintain soil function, quality and stability.	to wildfire Aberdeen	
7.1 Establish a programme to assess tree cover in Aberdeen and monitor the health of city trees and woodlands.		
7.2 Expand Aberdeen's tree coverage, planting resilient species at appropriate locations.		
7.3 Explore the use of trees and woodlands to reduce flood risk and provide shade and shelter in Aberdeen.		
8.1 Support the development of natural coastal defences, to improve the resilience of vulnerable soft coastal areas to flooding and erosion.		
8.2 Investigate opportunities to re-introduce meanders to watercourses, where appropriate, to slow down water flow.		
8.3 Encourage sustainable river bank management to reduce erosion.		
<b>Strong, healthy society and economy</b>		<b>Indicators</b>
9.1 Use Climate Just mapping to target action and reduce the risk of communities being disadvantaged in being able to prepare and respond to climate change.	<ul style="list-style-type: none"> <li>• Number of community resilience plans.</li> <li>• Number of business resilience plans</li> <li>• Number of community food growing sites.</li> <li>• Changes in pollutant levels within existing Air Quality Management Areas</li> <li>• % change in emissions levels</li> </ul>	
9.2 Develop a platform of support, information and learning, to build community capacity to prepare for severe weather events.		
9.3 Work with Community Planning Partners and local communities to increase the number of community resilience plans in place in Aberdeen.		
10.1 Inform health and social care providers on climate impacts for Aberdeen, to support local adaptation in this sector.		
10.2 Embed climate change in health and social care planning and in business continuity arrangements.		
10.3 Support ongoing monitoring and actions to improve city air quality and measures to integrate climate risk in air quality planning.		
11.1 Build understanding of the impact of climate change on key city business sectors; and encourage and support the development of business resilience plans.		
11.2 Investigate options for business growth from the adaptation sector; including through innovation, technology and skills development.		
12.1 Build understanding of risks to the food sector and opportunities to build resilience.		
12.2 Incorporate climate adaptation measures in new and existing food growing sites.		
<b>Building understanding</b>		<b>Indicators</b>
13.1 Encourage research programmes to address adaptation gaps and build knowledge of adaptation measures that work for Aberdeen.		<ul style="list-style-type: none"> <li>• Number of people reached.</li> <li>• Number of case studies – Aberdeen Adapts</li> </ul>
13.2 Develop adaptation partnership training and placement opportunities for students.		

13.3 Encourage project partners and volunteers through citizen science projects, to gather data on weather impacts and the local environment.	<ul style="list-style-type: none"> <li>• Number of participants in citizen science projects</li> </ul>
13.4 Learn from successful research and projects in other cities and regions and apply lesson learned to adaptation in Aberdeen.	
14.1 Increase engagement of local communities, businesses, schools and organisations through an adaptation education and information campaign.	
14.2 Establish a resource of information on climate risks, impacts and actions for the city and wider region.	
<b>Priority – Collaborative working</b>	<b>Indicators</b>
15.1 Deliver, monitor and review the Aberdeen Adapts Implementation Programme.	<ul style="list-style-type: none"> <li>• Evidence that adaptation has been embedded in local plans, policy, strategy and processes.</li> <li>• Number of funding applications</li> <li>• Number of collaborative projects</li> <li>• Number of partners</li> </ul>
15.2 Embed climate adaptation into new and reviewed key city plans, programmes and strategies.	
15.3 Identify the impacts of climate change on contingency planning and city priorities. Assessing the impacts of severe weather on Aberdeen.	
15.4 Liaise with the Local Resilience Partnership to investigate any impacts from climate change on emergency response and recovery arrangements.	

## Appendix 2

### Aligning Aberdeen Adapts with the UN Sustainable Development Goals

- **Protecting buildings and infrastructure** - contributes to SD goals of sustainable cities and communities, affordable and clean energy, clean water and sanitation, industry, innovation and infrastructure.
- **Safeguarding our natural environment** - contributes to SD goals of: life below water, life on land
- **Strong healthy society and economy** - contributes to SD goals of: zero hunger, good health and well being, reduced inequalities, decent work and economic growth, industry, innovation and infrastructure, sustainable cities and communities, responsible consumption and production
- **Building understanding** - contributes to SD goals of: sustainable cities and communities, quality education
- **Collaborative working** - contributes to SD goals of: partnerships for the goal.



### Supporting the National Performance Framework

- **We value, enjoy, protect and enhance our environment.**
- **We are healthy and active.**
- **We live in communities that are inclusive, empowered, resilient and safe.**
- **We have thriving and innovative businesses, with quality jobs and fair work for everyone.**
- **We are well educated, skilled and able to contribute to society.**

## Appendix 3

Legislation/ drivers		
<b>EU</b> <ul style="list-style-type: none"> <li>• EU Adaptation Strategy</li> <li>• EU Water Framework Directive</li> <li>• EU Floods Directive</li> <li>• EU Landscape Convention</li> <li>• The Habitats Directive</li> <li>• EU Noise Directive</li> <li>• EU Air Quality Directive</li> </ul>		
<b>Scotland</b> <ul style="list-style-type: none"> <li>• Climate Change Scotland Act 2009</li> <li>• UK Climate Change Risk Assessment</li> <li>• Climate Ready Scotland: 2<sup>nd</sup> Scottish Adaptation Programme</li> <li>• Planning (Scotland) Act 2019</li> <li>• Land Use Strategy</li> <li>• Civil Contingencies Act (2004)</li> <li>• National Planning Framework for Scotland</li> <li>• Scottish Planning Policy 2014 – including Planning Advice Notes on water and drainage and Planning and Sustainable Urban Drainage systems</li> <li>• Flood Risk Management (Scotland) Act 2009</li> <li>• National Flood Risk Assessment (NFRA) 2018</li> </ul>		
Buildings & infrastructure	Nature	People & Economy
<ul style="list-style-type: none"> <li>• Building Standards</li> <li>• Design Manual for Roads and Bridges</li> <li>• Maintaining Scotland's Roads</li> <li>• National Transport Strategy</li> <li>• Historic Environment Policy for Scotland (HEPS)</li> <li>• Property Flood Resilience Action Plan</li> </ul> <b>Local</b> <ul style="list-style-type: none"> <li>• Local Housing Strategy</li> <li>• Aberdeen City and Shire Strategic Development Plan</li> <li>• Aberdeen Local Development Plan</li> <li>• North East Flood Risk Management Plan</li> <li>• Aberdeen City Council Building Performance Policy</li> <li>• NESTRANS Regional Transport Strategy</li> <li>• Aberdeen's Local Transport Strategy</li> <li>• Powering Aberdeen</li> <li>• City Centre Masterplan</li> </ul>	<ul style="list-style-type: none"> <li>• Scottish Biodiversity Strategy 2006</li> <li>• Scotland's Forestry Strategy 2019-2029</li> <li>• Marine (Scotland) Act 2010</li> <li>• Scotland's National Marine Plan</li> <li>• Pollinator Strategy for Scotland 2017-2027</li> <li>• UK Forestry Standard</li> <li>• Greening the NHS</li> <li>• Scottish Soil Framework (2009)</li> <li>• 2020 Challenge for Scotland's Biodiversity</li> </ul> <b>Local</b> <ul style="list-style-type: none"> <li>• Aberdeen Nature Conservation Strategy 2010-2015</li> <li>• Aberdeen Open Space Audit &amp; Strategy 2011-2016</li> <li>• Dee Catchment Management Plan</li> <li>• River Basin Management Plan</li> <li>• Proposed Trees and Woodlands Strategy</li> </ul>	<ul style="list-style-type: none"> <li>• Community Empowerment Bill</li> <li>• Cleaner Air for Scotland Strategy</li> <li>• Inshore Fisheries Strategy</li> </ul> <b>Local</b> <ul style="list-style-type: none"> <li>• Air Quality Action Plan</li> <li>• Regional Economic Strategy</li> <li>• Refreshed Local Outcome Improvement Plan 2016-26</li> <li>• Community Risk Register</li> <li>• Strategy for an Active Aberdeen 2016-2020</li> <li>• NHS Grampian Local Delivery Plan</li> <li>• Aberdeen City Waste Strategy</li> <li>• Proposed Granite City Growing: Aberdeen Growing Food Together 2020</li> <li>• Active Aberdeen Partnership's Strategy for an Active Aberdeen</li> <li>• Aberdeen's Sports Facilities Strategy</li> </ul>

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