

Aberdeen Adapts

Building resilience and adapting to our changing climate

A draft for consultation

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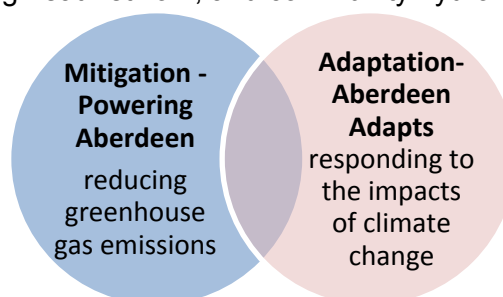
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Executive summary

Aberdeen Adapts is a framework for collaborative working. It aims to ensure the city is meeting the challenges and opportunities of climate change.

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 (mitigation), there is a need to take action to prepare for inevitable changes in climate (adaptation). Aberdeen Adapts will sit alongside Powering Aberdeen, the city Sustainable Energy Action Plan for a co-ordinated city-wide approach to climate change.



We need to adapt...

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

This framework provides a clear direction for adaptation, with priorities, goals and action areas that will help Aberdeen to prepare.

It sets out actions to **prevent** impacts from climate change and 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 emerging information. In others, we should strive to **innovate** and make use of new technology.

However, the key to successful adaptation for Aberdeen will be if we **collaborate**, share experiences, build understanding and work together.

Aberdeen has already started the adaptation journey...

Aberdeen Adapts builds on the initiatives that are already helping to strengthen city resilience, recognising the multiple benefits these projects bring.

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 successful 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 changing² 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 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 the devastating impacts of Storm Frank, when the city experienced intense rainfall and flooding, local businesses were closed, transport was disrupted and people were evacuated from their homes.

By getting prepared for climate change Aberdeen is looking ahead to remain thriving and liveable. 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.

Supporting these ambitions climate resilience is an increasing priority for the city. It is a stretch outcome under the Local Outcome Improvement Plan and is embedded in plans and policy, including planning and transport.

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, threats from climate change and adaption 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 Places³ 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, to ensure the wider views of local people were taken on board.

Aberdeen Adapts sets out the key climate challenges affecting various city sectors and establishes adaptation goals for the future. 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 partnerships work to direct and deliver adaptation action.

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 provide 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.

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:

Protecting people	<ul style="list-style-type: none"> • Flooding, erosion, tidal surge and heatwave events could affect the health, safety and wellbeing of people who live work and visit Aberdeen.⁴ • For vulnerable people, the impacts could be even greater, widening inequalities.⁵
Safeguarding assets	<ul style="list-style-type: none"> • Reduce damage to Aberdeen's buildings and infrastructure; prevent a loss of value and increased insurance costs. • Preserve the structure and function of city assets.
Robust decision making	<ul style="list-style-type: none"> • 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. • Planning ahead, means there is time to build climate impacts into decision making, helping to keep planned investment secure.
Reduce costs	<ul style="list-style-type: none"> • Adaption makes good business sense, reducing economic risk and encouraging investor confidence. • Without interventions, the average annual damages from flooding alone in Aberdeen could cost over £17 million.⁶ • By taking timely action, Aberdeen can access funding opportunities, has time to establish low/no cost adaptation responses and can mainstream adaptation into policy and decisions to avoid future costs.
Improving use of resources	<ul style="list-style-type: none"> • 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. • By combining the knowledge and expertise from local business, organisations and further education, Aberdeen is a good position to develop intelligent solutions that are appropriate for the city.
Delivering multiple benefits	<ul style="list-style-type: none"> • Adaptation measures can enhance areas, increase biodiversity and insulate and cool, reducing energy costs. They can help to reduce flood risk and air pollution, in doing so improve health and quality of life. The journey to develop Hazlehead Park as climate change park is helping to keep the park healthy and accessible for people to enjoy.
Meeting regulation	<ul style="list-style-type: none"> • For many public sector organisations adapting to climate change is a legal duty, under the Climate Change (Scotland) Act 2009, to protect critical services and infrastructure. • Adaptation helps to meet a range of objectives in many plans, programmes and strategies (<i>Appendix 1</i>).
Supporting growth	<ul style="list-style-type: none"> • 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%.⁷ • Investor confidence is boosted in cities that have protected their place, people and prosperity, and seized new opportunities.

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, affecting us all.⁸

Increased risk of flooding

Flooding has already had devastating impacts on many people living in Aberdeen. With climate change likely to alter rainfall patterns and bring more heavy downpours, flood risk is expected to increase 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 rise 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 recreational facilities. 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 to the coast.

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 avoid 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.

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.

Aberdeen's northerly location means there is a strong reliance on transport for goods, travel and business. These transport routes will be vulnerable to surface and structure damage from flooding, heat and erosion.

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. Climate change may alter the delicate ecological balance in the river and 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 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 to customers. Disruption to transport, energy and communication networks in Scotland and around the world could affect markets and affect 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 growing 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 new threats will have to be managed to ensure they do not disrupt the lives of individuals and communities, limit access to vital services or 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 occurring as a result of temperature fluctuations. As an energy city it is vital Aberdeen stays connected. Energy planners will need to plan for these changes, to ensure energy security and to embrace energy opportunities.

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 may bring opportunities for food producers and communities to grow more food locally.

The productivity of our agriculture and forests

A warming climate has the potential to improve growing conditions in the north east and increase the productivity of our agriculture and forestry. However, climate change will also pose a number of threats to these sectors, 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 productive areas and social amenities.

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 on 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

Aberdeen Adapts is a framework for collaborative working. Incorporating the views of city organisations and communities, it sets out a pathway for resilience and the foundations for working on adaptation in the long term.

Key overarching principles underpin the Aberdeen Adapts Framework and support adaptation for the city (Figure 1).

Figure 1: Key principles for adaptation



About the approach

Aberdeen Adapts priorities, goals and action areas were developed and reviewed with stakeholder input

- **Priorities** - 5 adaptation priorities provide a focus for adaptation in Aberdeen, over cross-cutting themes of protecting buildings and infrastructure; safeguarding our natural environment; a healthy society and strong economy; building understanding; and collaborative working. Under each priority participants developed:
- **Goals & action areas** - A series of 15 goals set the long-term ambition for Aberdeen Adapts, helping to build a picture of what adaptation could look like for the city by 2050.
To help meet each of these goals, actions areas for partnership working set out how we will adapt. These actions identify ways to strengthen Aberdeen's resilience to climate change and build on the local adaptation measures that are already emerging and delivering multiple benefits in the city. (See Figures 2& 3)
- An **Implementation Programme** will be produced and updated every 5 years to deliver phased measurable partnership actions to work towards these goals.

Figure 2: Aberdeen Adapts adaptation priorities and goals

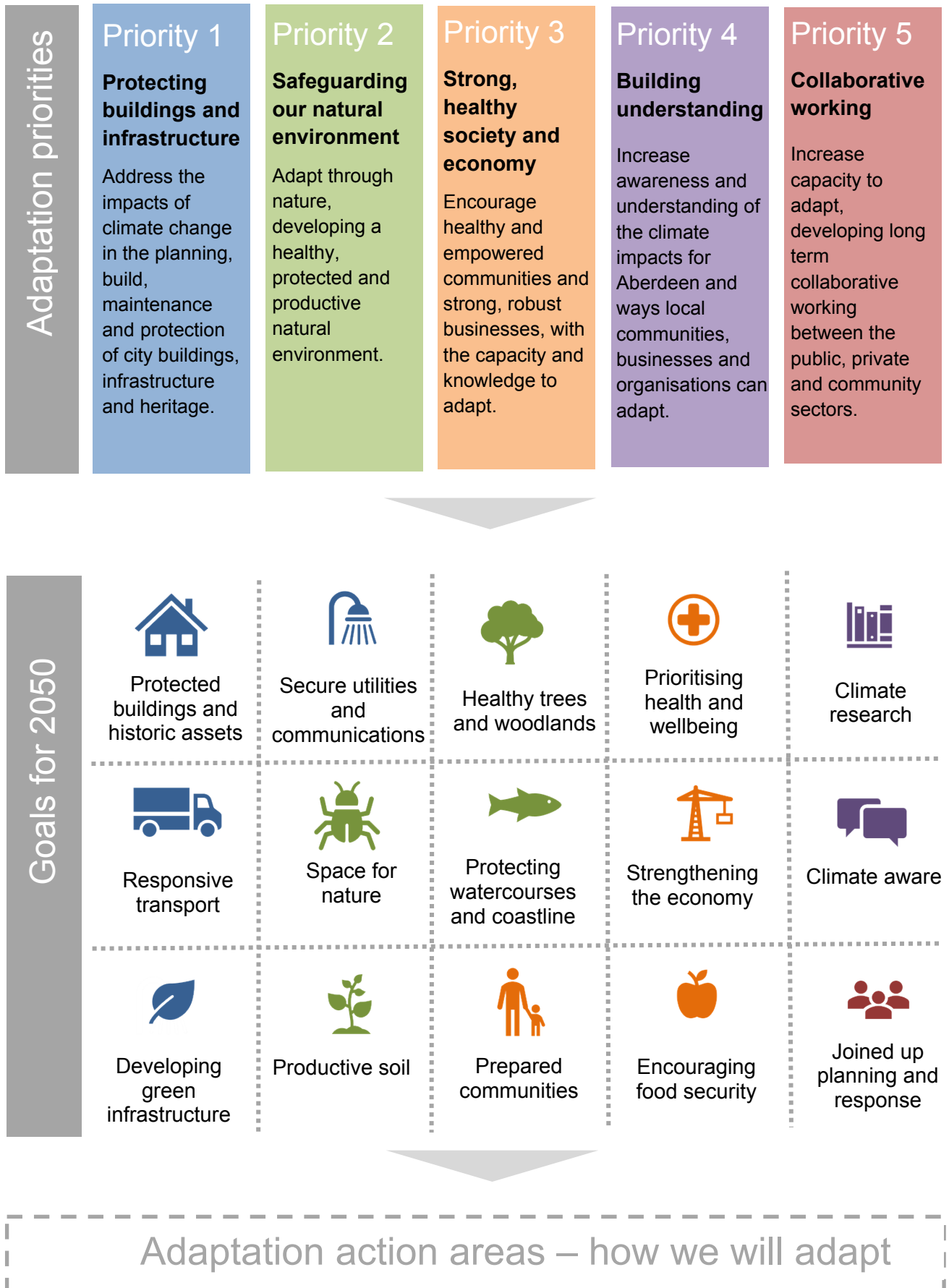


Figure 3: Adaptation action summary

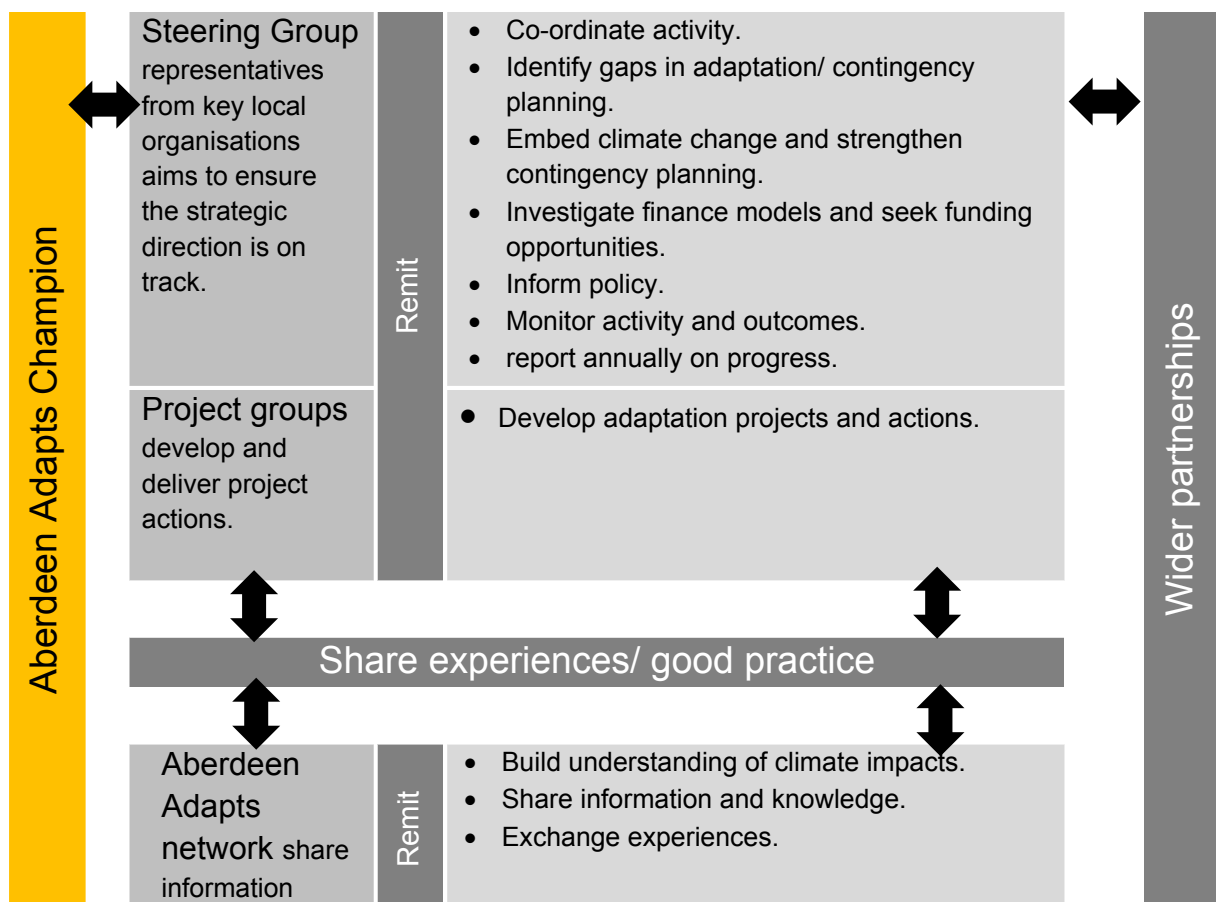
		<ul style="list-style-type: none"> • assess vulnerability • strengthen policy & planning • guidance, training and skills development 	<ul style="list-style-type: none"> • secure energy • insulation/ natural cooling • maintain coastal protection & flood schemes 	<ul style="list-style-type: none"> • develop green/ blue infrastructure: green roofs & walls, “grey” and “green” Sustainable Urban Drainage Systems (SUDs), swales, flood plains, raingardens, gardens, parks, wetlands etc
		<ul style="list-style-type: none"> • resilient design & retrofit • maintenance & property protection • porous surfaces 	<ul style="list-style-type: none"> • maintain flood schemes • water efficiency & collection systems • digital technology 	
		<ul style="list-style-type: none"> • greenspace networks • planning and land management 	<ul style="list-style-type: none"> • climate change parks • species monitoring & citizen science 	<ul style="list-style-type: none"> • retain soil carbon • protect soil function
		<ul style="list-style-type: none"> • policy, strategy • diverse species • rewilding • expanding tree coverage 	<ul style="list-style-type: none"> • monitoring for pests and disease/ INNs • green corridors • proactive management 	<ul style="list-style-type: none"> • re-naturalising watercourses • catchment planning • protecting river banks
		<ul style="list-style-type: none"> • community/ remote working hubs • protect health and care facilities 	<ul style="list-style-type: none"> • community resilience plans • climate just mapping • information/ assistance 	<ul style="list-style-type: none"> • business resilience plans • diverse supply chains • remote working
		<ul style="list-style-type: none"> • protect home health care settings 	<ul style="list-style-type: none"> • adapt growing sites 	<ul style="list-style-type: none"> • opportunities for growth
		<ul style="list-style-type: none"> • adaptation research • link to local projects • student opportunities • training • education 	<ul style="list-style-type: none"> • skills/ knowledge • share knowledge • communications • exchange good practice 	<ul style="list-style-type: none"> • citizen science • engage young people • signposting
				
		<ul style="list-style-type: none"> • share knowledge • wider partnership working • embed adaptation • review and monitor 	<ul style="list-style-type: none"> • build understanding • exchange good practice • identify innovation • encourage involvement 	<ul style="list-style-type: none"> • opportunities to collaborate • deliver adaptation actions • learn from others
				

Making it happen

Aberdeen Adapts aims to establish a collaborative approach to drive forward city adaptation, share information and co-ordinate activity. Stakeholder views on the priorities, role and options for adaptation governance were gathered during workshops, these are summarised in Figure 4.

A need for monitoring of adaptation activity and outcomes and develop a means to inform policy, co-ordinate activity, share information, raise awareness and develop shared actions was highlighted. Establishing governance is a key action for Aberdeen Adapts.

Figure 4



Funding

Early action to adapt to climate change allows time to integrate low or no cost actions or plan ahead to avoid costs through informed decision making.

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 for monitoring 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 will investigate appropriate funding routes, such as grants and external funding, collaborative working, private investment, national subsidies and support packages, capital investment programmes and crowd funding.

Monitoring

Monitoring will help to measure climate trends and impacts to make sure action is aligned against levels of change. It will also be essential to track adaptation progress, measure the effectiveness of systems and allowing the learning from Aberdeen Adapts actions to be captured, evidenced and assessed. This can inform climate reporting, decision making and any wider roll out and mainstreaming of adaptation actions.

A mix of key qualitative and quantitative measures to support monitoring of Aberdeen Adapts are set out in Figure 5. Further measures will be set against Aberdeen Adapts sub actions in the Implementation Plan, building on those already in place across existing plans and policy.

Figure 5: Measuring and monitoring

Buildings and infrastructure	Building condition and disrepair	Evidence of flood management measures	Uptake of property-level protection and water efficiency measures	Evidence climate change has been embedded in plans and policy.
Natural Environment	Number BGI projects	Number of trees planted	Number of climate change parks	Increase in pests, disease and INNS
Society and economy	Number of community resilience plans	Number of business resilience plans	Uptake of property-level protection measures	Evidence of growth in the green economy
Building understanding	Number of people reached	Number of case studies	Number of education projects	Weather Impact Reports
Collaborative working	Number of collaborative projects	Number of funding applications	Evidence that adaptation has been embedded in local plans, policy, strategy and processes.	

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 1

Protecting buildings and infrastructure

Current adaptation examples

An Integrated Catchment Study - improving understanding of the drainage network and informing city flood management.

Flood protection schemes are being delivered through the North East Flood Risk Management Plan.

Green Roofs are on a number of city buildings including - Seaton Energy Centre, Pets Corner and The Events Complex Aberdeen.

A Property Level Protection grant scheme - supports flood protection.

A programme of work to restore and protect Aberdeen Beach from erosion, due to tidal action, took place in 2006.

SNH Green Infrastructure Funding contributed to a project deculverting the Scatter Burn, establishing natural flood management at Middlefield.

Goal 1 - Protected buildings and historic assets

Timely maintenance, flexible design and planning for change is helping to keep city buildings resilient, people safe and insurance costs low. The Granite City's historic character and much-loved heritage is preserved and protected for the benefit of future generations, through subtle changes to the care and management of traditional buildings and archaeological sites.

How will we adapt?

By assessing the vulnerability of Aberdeen's buildings and heritage to changes in storms, heavy rain and warmer temperatures. Damage and costs in the long term can be reduced or avoided, by decisions on where we build and through resilient design and construction.

By strengthening our plans and policies as we learn more about how the climate will affect buildings and their surroundings. While the planning process considers flooding, to meet city growth plans it will be essential to plan for change in temperature and rainfall. Informing planners and designers through adaptation guidance and training.

By identifying opportunities to retrofit adaptation. With 32% of city buildings built before 1945 many of Aberdeen's buildings were designed for a different climate. Where property upgrade and regeneration is taking place, retrofitting adaptation, can help to future proof property.

By increasing awareness of the simple measures people can take, from property protection to regular maintenance, to reduce damage from water penetration and storms to their buildings. Highlighting the benefits of retaining green space and permeable surfaces around buildings, to absorb rainfall and reduce flood risk.

By identifying ways to adapt city heritage, in a sympathetic way and by addressing the current skills gaps in the care and repair of traditional buildings, Aberdeen Adapts can help to conserve local history without loss of character.

City heritage gives a sense of place, it can attract visitors and generate income and jobs. Aberdeen's heritage has already stood the test of time and with proper maintenance and adaptive management these historic assets can be cornerstones of resilience.

Action areas:

- 1.1** Assess the vulnerability of Aberdeen's buildings, infrastructure and heritage to climate change. Identifying retrofit opportunities to increase resilience for buildings and infrastructure at risk.
- 1.2** Embed climate adaptation in plans, policy and asset management, to improve the climate resilience of buildings and infrastructure.
- 1.3** Develop guidance on adapting the built environment in Aberdeen to inform designers, developers, planners and home owners.
- 1.4** Support the development of skills in adapting buildings; and in the care and repair of traditional buildings and assets.

Goal 2 - Responsive transport and infrastructure

Long-term planning and regular assessment keeps local transport infrastructure resilient to shocks, protecting people and ensuring businesses stay active. Close collaboration

between agencies allows traffic to keep flowing in the face of severe weather, this keeps the city bustling when the weather is fair, and safe and secure when it is not.

Better understanding of the dynamics of soft coastal areas and well adapted coastal defences and transport routes are protecting people and travel.

How will we adapt?

Widening travel modes and options.

Establishing flexible transport networks, linking different modes of transport and increasing travel options to assist travel during severe weather. To be resilient and responsive to climate change, co-operation is crucial.

Through smarter travel and remote working. Making use of technology to support travel planning, providing the means to better inform people's journeys during severe weather and to make home and remote working easier.

With resilient design and upgrade. By planning ahead, adaptation can be designed in to new and upgraded transport infrastructure, to reduce the risk of damage and disruption. In doing so, support Local Transport Strategy aims for a resilient transport network.

Through greater understanding on how to adapt the existing travel infrastructure in Aberdeen and the most effective measures for the city. From specifications that are robust to future rain and heat levels. To water management solutions, such as SUDs

and swales to reduce the risk of flooding, degraded surfaces and pollutants.

Through the use of porous surfaces, where practical, to soak up rainfall, helping to keep active travel routes accessible during heavy rainfall.

Through regular inspection and monitoring for early identification of any issues that can limit damage to travel infrastructure. Giving attention to the risk of landslip where there are steep gradients on road and rail verges.

By making shoreline plans. While new development takes into account coastal change. Maintaining coastal defences, monitoring for change and strengthening protection, where required, will be essential to protect against flooding and erosion as the sea level rises. Collaboration with Aberdeenshire and key coastal partners can help existing coastal areas to adapt. Maintaining assessment of coastal protection under the North East Flood Risk Management Plan and through the delivery of the Integrated Coastal Zone Management.

Action areas:

1.5 Encourage climate resilience in the planning, maintenance and management of local transport networks to support access and connectivity and reduce damage and disruption.

1.6 Develop opportunities for remote working to improve safety, business continuity in severe weather.

1.7 Encourage use of permeable surfaces, to improve drainage and reduce flood risk.

1.8 Develop plans for vulnerable shoreline areas, building on existing studies and investigate opportunities for natural solutions to reduce erosion.

Goal 3 – Developing green infrastructure

Through natural flood management and building greenspace and leisure areas into necessary flood defences, new community spaces have been created in the city. Nature-based solutions, from roofs, to walls, to edges, are capturing water and providing shade

and shelter, as well as creating space for people and wildlife to thrive. These changes are building healthy, attractive places to relax and play for part of the year and an effective defence against the elements when required.

How will we adapt?

By managing flooding. Partnership work has identified local areas potentially vulnerable to flooding. Prioritised measures under the North East Flood Risk Management Plan are being put in place, and a range of city schemes are already in place and being developed to help manage flood risk.

Aberdeen Adapts can support this work promoting measures, such as grey and green sustainable urban drainage systems (SUDs), swales and raingardens, to reduce pressure on drainage systems during heavy rainfall. Encouraging space for water to ebb and flow through wetlands and flood alleviation areas.

The use of technology can play a role, monitoring impacts and providing early alerts.

By enhancing opportunities for urban greening and the use of blue, green

infrastructure (BGI) as a cost-effective means of adapting city spaces. Encouraging the Granite City to become greener has benefits including, absorbing rainfall, providing shade and shelter, helping to improve air quality and keeping urban spaces cooler as temperatures rise. With the right designs, BGI can make significant improvements to urban places.

It is important to find out what works for Aberdeen’s climate and landscape; share good practice and integrate approaches in the planning, development and regeneration of our city. Where maintenance and ownership of BGI is addressed, it can become an essential part of city critical infrastructure.

The East Tullos Burn Environmental Improvement Project has re-naturalised the burn to slow down the flow of water and created wetland areas.

Action areas:

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

1.10 Encourage the use of appropriate BGI in new development and regeneration. Investigating opportunities to test and mainstream BGI.

What will this look like?

- Parks	- SUDs, swales	- Raingardens	- Green roofs
- Flood plains	- Green corridors	- Re-naturalising	- Wetlands
- Trees	- Porous surfaces	- Gardens	- Green walls

Goal 4 - Secure utilities and communications

Collaboration, forward thinking and innovation has kept critical energy, water and communications secure, efficient and reliable. Our resilient digital infrastructure has established smart solutions to monitor change, allowing a more flexible and responsive approach to weather extremes.

How will we adapt?

By building secure local energy solutions. With low carbon energy a priority for the city, factoring opportunities and risks from temperature and rainfall change into decision making, will help to keep local energy systems secure in the long term.

By investigating natural solutions to the cooling and ventilation of buildings, through vegetation, shading and design to avoid increased energy demand in hotter weather. Giving due consideration to the urban heat island effect, that will make dense urban areas feel much warmer, especially at night.

Through the use of digital technology to help Aberdeen prepare, improving communications, connectivity and developing early warning systems for severe weather.

By using water sustainably and efficiently to conserve valuable water resources when the weather is drier and reduce future stresses on the supply of water from the River Dee, as the city grows.

Encouraging 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 retrofit.

Action areas:

1.11 Increase collaboration with key sector players to ensure water, transport, energy, digital sectors have an integrated approach to managing climate risks.

1.12 Assess climate opportunities and risks for city renewable energy infrastructure.

1.13 Encourage sustainable water use in homes and businesses, including water efficiency, rainwater harvesting and grey water recycling, to protect water quality and availability.

1.14 Investigate opportunities for technological solutions to support adaptation – through mapping, modelling and monitoring.

Priority 2

Safeguarding our natural environment

Current adaptation examples

<p>Hazlehead Park is a climate change park - a range of design and management adaptation actions are protecting this space for the future.</p>	<p>Around 210,000 trees were planted in the city as part of the Tree for every Resident initiative.</p>	<p>A Green Space Network connects Aberdeen's habitats and species, urban and rural green spaces.</p>
<p>Seaton Wetland project, created an official wetland to deal with flooding issues at the park.</p>	<p>A River Basin Management Plan is addressing water quality and quantity.</p>	<p>East Tullos Burn Environment Improvement Project included a new meandering course for the burn, as well as the creation of wetland pond areas to help manage water.</p>

Goal 5 – Space for nature

Monitoring of species numbers and habitat health has allowed 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.

The quality of our parks and greenspaces is maintained and they able to flourish when the weather is dry and manage rainfall when it is wet.

How will we adapt?

Through better connected habitats, enhancing Greenspace Networks to encourage the space for nature and wildlife to adjust to a changing climate.

By helping nature flourish through urban greening and rewilding, to restore natural systems and help nature thrive. From wildflower planting to places for pollinators, making space for nature in urban areas from rooftops to verges.

Through active monitoring for change, enhancing work to respond to invasive non-native species (INNS) and the pests and diseases that could threaten local plants and wildlife.

Encouraging citizen science initiatives to identify changes in wildlife distribution and numbers in the city. This can contribute to valuable data collection, that can support the work of the North East Scotland Biological Records Centre (NESBReC)

and increase understanding of local nature.

By encouraging a resilience approach to the management of greenspaces, parks and gardens, building on the knowledge gained in developing Hazlehead as a Climate Change Park. Making adjustments as the growing season lengthens, addressing drainage and choosing plants resilient to change. Small changes can have big impacts, saving future maintenance demands.

Exploring opportunities for water collection to help the city horticulture flourish when the weather is dry.

By reducing pressures. Partnership work to address wilful fire raising at several nature sites in the city has informed people about wildfire. Wider awareness programmes can reduce wildfire risks when the weather is hot and dry.

Action areas:

2.1 Assess the vulnerability of Aberdeen's natural environment to climate change and the implications for biodiversity. Establishing processes to monitor changes.

2.2 Strengthen adaptation in plans, policy and strategy, as we learn more about how the climate will affect the natural environment.

2.3 Support opportunities to expand Aberdeen's green space network and increase naturalised green spaces in the city, to improve habitat connections.

2.4 Increase awareness, monitoring and management for INNS and for pests and disease.

2.5 Develop a resilient approach to the management of Aberdeen's parks, gardens and greenspaces to maintain plant health and accessibility.

2.6 Trial approaches in natural capital and ecosystem services, to support and inform decision making in resilience.

Goal 6 - Productive soils

Our soils are healthy and productive supporting food production and the health of our natural environment, as well as providing effective drainage. With a longer growing season, safeguarding Aberdeen's soils has brought benefits for nature and local growing.

How will we adapt?

By providing guidance and information on the importance of soil and the risks of soil pollution to health. Increasing understanding of ways to improve soil management.

By protecting soil quality and function. The State of Scotland's Soil ranks climate change as the greatest aggregated pressure on soils. Climate change will affect soil over time and taking action can help to protect soil function, so it can continue to absorb rainfall, support biodiversity and food growing.

By protecting carbon stores. Healthy soil is important for Aberdeen, it is an important store of carbon. Because of this

the need to retain soil carbon is stated in the Aberdeen Local Development Plan.

Through sustainable land management and development. As Aberdeen expands in future years there will be competition for land use, with climate change adding to pressures. It will be important for the planning to strengthen policy and encourage sustainable use of soils in construction. The development of brownfield sites can help to reduce soil compaction and the use of porous and permeable surfaces will mean soils can soak up rainfall and pollutants; helping to prevent flooding and erosion.

Action areas:

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

2.8 Produce guidance on adaption for Aberdeen's natural environment, to support the protection of species, habitats, watercourses, and to reduce loss of soil function.

Goal 7 - Healthy trees and woodlands

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

How will we adapt?

By expanding tree coverage. Increasing trees and woodland areas to help slow down run off during wetter weather. Measures such as wet woodland in river catchments, riparian woodland buffers and upstream planting can help to stabilise river banks reducing flood risk and erosion.

Trees can absorb carbon and contribute to clean air, making an important contribution to the urban environment.

By planning green corridors to provide leafy connections for wildlife, contribute to clean air, as well as provide shelter, shade and cooling, as temperatures rise.

By identifying and prioritising a diverse selection of trees restocking and expanding tree cover. Ensuring they are suitable for warmer, drier summer weather and waterlogged winters.

Exploring the use of street trees to reduce flood risk in urban areas during heavy rainfall, such as the use of tree pits as temporary storage for rainfall during heavy downpours, reducing pressure on drains.

By maintaining healthy growth of street trees and woodlands as the climate changes. Aberdeen Adapts will promote actions to build resilience into tree management. Encouraging options for tree monitoring to improve understanding of the condition of trees. Enabling vigilance and the early detection of pests, disease; and any damage and decline from increases in wet and stormy weather.

Considering climate change and the impact of changes to tree growth in the creation and management of Granite City Woodlands.

Action areas:

2.9 Encourage tree health surveillance and the sustainable management of city trees and woodlands.

2.10 Expand city tree coverage, with resilient species selection at appropriate locations.

2.11 Explore the role of trees and woodlands to reduce flood risk and provide shade and shelter in urban areas.

Goal 8 - Protecting watercourses and coastline

Our rivers, streams and burns are healthy, natural resources, with excellent water quality sustaining a diverse range of species. Aberdeen's dynamic coastline is safe and able to adapt to coastal change. As the North Sea has become warmer, sustainable fishing has maintained Aberdeen's traditional links to the sea.

How will we adapt?

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 planning can help protect water quality and quantity, as well as reduce impacts from temperature, flooding and pollution on aquatic life.

By re-naturalising watercourses, where appropriate, to create more meandering routes that can slow down the flow of water.

Creating 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 our rivers will naturally have space to adapt, protecting people and places.

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

Building a better understanding of

changing coastal conditions and how to work with dynamic natural processes. Measures such as beach nourishment and dune restoration can reduce damage and help protect Aberdeen's familiar coastal landscape.

By working in collaboration with Aberdeenshire and wider partners, to support a healthy and safe coastline, able to naturally adapt to coastal change. Encouraging plans for joined up coastal management to reduce impacts from a rise in sea level, storm surge and wave overtopping. Addressing risks such as coastal flooding and erosion to pockets of soft coastal area.

Through monitoring and management to address changes in distribution and numbers of fish, marine mammals and sea birds. A warmer North Sea has already brought changes for the fishing industry, with changes to quotas and management as fish stocks move north.

Action areas:

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

2.13 Investigate opportunities to re-naturalise water courses, where appropriate, by reintroducing curves and loops to slow down water flow.

2.14 Encourage sustainable river bank management to reduce erosion, enhancing the development of natural riparian habitats and using techniques, such as willow spiling.

Priority 3

Strong, healthy society and economy

Current adaptation examples

Culter Community Resilience Plan has identified community arrangements that can compliment the response from emergency services in a flooding or storm.

Aberdeen's Local Outcome Improvement Plan includes drivers to develop community resilience.

Friends of Seaton Park achieved a RHS Award for Overcoming Adversity, for work to clean up Seaton Park and the debris left by floods.

Low carbon resilient cities review for Scottish cities looked at the economic risks and opportunities from climate change.

Granite City Growing is developing spaces for community food growing in Aberdeen.

An Edible Green Walls project worked with city school pupils to encourage food growing in school grounds.

Goal 9 - Prepared communities

Our communities are informed, aware of their options and prepared for severe weather. Community and remote working hubs have become centres of community activity able to provide safe places and a connection with local services. These connected communities know each other better and naturally band together when challenges arise.

How will we adapt?

By encouraging community resilience.

Aberdeen Adapts aims to build on established networks and connections, encouraging communities to plan, prepare for, severe weather events. In doing so, support Local Outcome Improvement Plan (LOIP) priorities for community resilience.

Building the skills and knowledge to adapt can help to make communities stronger, as well as safer. Communities understand their local area and are well placed to observe and report any emerging local challenges such as water leaks, blocked drains and flooding, that could allow more timely action.

Inspired community actions can make a difference. Tree planting, installing water butts and work to clean up a city park after flooding, are just some of the ways that

communities in Aberdeen have already contributed to resilience.

By keeping people informed.

Developing a platform for support, clear communication and collaboration, so local people know how to keep safe and where to go for assistance. Helping to identify safety points and needs, to support local readiness, response and recovery. Increasing awareness of Local Resilience arrangements already in place for emergency situations.

Through a climate just transition.

Climate change can widen inequalities, such as being unable to afford insurance or adaptation measures. It can affect existing health issues. Aberdeen Adapts will consider those that may be vulnerable and support actions to prevent people from being disadvantaged in being able to respond to climate change.

Action areas:

3.1 Identify climate vulnerable community sectors in Aberdeen and ways to address climate inequalities.

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

3.3 Encourage and support the development of community resilience plans; assisting resilience drivers under the LOIP.

3.4 Identify opportunities to increase community preparedness for climate risks and recovery from specific events.

Goal 10 - Prioritising health and wellbeing

The new leisure spaces created by natural flood management schemes, protected parks and active travel networks have contributed to improving the health of the city. The changing climate continues to create risks, such as new diseases and extreme weather events, but strong partnerships between healthcare providers and city officials mean they are ready to respond to change.

How will we adapt?

By embedding climate change in health and social care planning and in business continuity arrangements, Aberdeen's health and social care services can reduce impacts on services and facilities.

By managing the risks of flooding, storms and heat, on health and social care facilities and patient transport, to protect critical care.

Establish a cross sector approach with responsive systems to prepare for impacts on health and a ready response to health outbreaks. Protecting the young, the old and those in poor health, who may be less able to respond to climate change or may suffer more from the impacts. With studies showing the links between greenspace and health and wellbeing, opportunities to build links with nature

linking to opportunities for the natural can have a positive impact on people's health.

Through a good flow of information on how local health will be affected by climate change. This includes pressures from disease outbreaks; from increases in damp and air pollution affecting people with respiratory illness; from flooding, impacting physical and mental health; and from overheating, especially in health and care facilities, affecting vulnerable people.

By protecting home care settings, around 26% of people aged 65 years and over in the city, with high care needs are cared for at home. This means health and well-being outcomes are firmly linked with the success of measures to adapt Aberdeen's buildings and infrastructure.

Action areas:

3.5 Improve data sharing and an effective flow of information, to support adaptation, across the social and health care sector.

3.6 Embed climate change across health and social care providers. Encouraging resilient premises and ensuring contingency planning integrates climate risks.

3.7 Increase education and monitoring for early identification of local health impacts from a changing climate.

3.8 Support ongoing monitoring of city air quality and measures to integrate climate risk in air quality planning.

Goal 11 - Strengthening the economy

City businesses are strong and robust, working together and taking steps to climate proof their business and supply chains. Transferrable skills from industries such as oil and gas have been redirected into creating new solutions to climate challenges. Seizing these new economic opportunities, our resilient city is attractive for investors and well placed for business growth.

How will we adapt?

By encouraging forward planning and the development of business resilience plans. Making sure local businesses remain competitive throughout disruptions to communication, transport and supply chains and saving the cost of damage to stock and premises from severe weather events. Increasing awareness and management of climate risks, to help protect investments.

Promoting flexible working and investigating options to enhance remote working to boost business resilience. Aiming to keep businesses open and active, while prioritising staff safety, during and after severe weather.

By encouraging diverse supply chains and links to local suppliers. Local businesses can prepare for times when products and raw materials may be scarcer or prices more expensive.

Through opportunities for growth adapting to climate change can support economic objectives for the region. A changing climate may mean opportunities for local jobs in sectors such as food growing and tourism. 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.

Action areas:

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

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

Goal 12 - Encouraging food security

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

How will we adapt?

Through resilient supply chains.

Severe weather events can disrupt supply chains, with damage to produce, increased prices or delays in the distribution of goods. Around 22,000 people are employed in the food and drink sector in the north east of Scotland. Promoting resilience in food production and supply chains, Aberdeen's businesses and organisations can help to make sure a wide range of food is available and accessible for citizens supporting city sustainable food ambitions.

By encouraging food growing. As warmer weather extends the growing season, there will be new opportunities for the home grower and food businesses, helping to support food security. Aberdeen

Adapts supports *Granite City Good Food* and opportunities to increase local food growing and sharing.

By adapting city growing sites, whether existing or new food growing spaces, so they remain productive and accessible in the future. Measures including improved drainage, permeable surfaces, windbreaks, raised beds, effective soil management and rain water collection can help to adapt.

By learning more about climate impacts on local food crops and trialling different times for planting and species selection as the climate changes. By exploring opportunities to use vertical and roof spaces for food growing.

Action areas:

3.11 Encourage the integration of climate adaptation measures in food growing sites.

3.12 Raise awareness of the impact of climate change on food standards and quality; and encourage food safety.

Priority 4

Building understanding

Current adaptation examples

<p>21%</p> <p>Public in Aberdeen would welcome support for the community to prepare for severe weather</p>	<p>36%</p> <p>Public in Aberdeen would like more information about what to do to address climate change</p>	<p>Students from the University of Aberdeen, MSc Environmental Partnership Management course ran student surveys on adaptation.</p>
<p>Fernielea School took part in a 'Flood Awareness' Week, enabling pupils to learn about how to become more resilient to flooding events.</p>	<p>An Arts and Climate Change event at Middlefield Community Hub looked at climate change and communities.</p>	<p>Aberdeen Climate Action have carried out local awareness raising events and co-ordinate a North East Climate Week programme.</p>

Goal 13 - Climate research

Aberdeen's education institutions are pursuing cutting edge climate research and low carbon technologies. As the climate continues to adjust, this research helps to identify the challenges still to come and provides information on the tools to take effective early action. Aberdeen has built on its reputation as a city of innovators, by becoming an adaptation research and development hub.

How will we adapt?

By encouraging adaptation research that is relevant and innovative for the city. Considering opportunities for co-operation and joint initiatives between institutions.

By making use of the knowledge and expertise at the University of Aberdeen, RGU and James Hutton Institute, to inform resilience through accredited research.

By linking local research in adaptation with cost effective, on the ground demonstration projects. Helping to narrow the gap between research, policy and practicalities

By sharing any learning with city organisations that may benefit from that

adaptation knowledge. By learn from successful research and inspiring projects in other cities and apply lesson learned to adaptation in Aberdeen.

Through student projects and placements, Aberdeen Adapts will consider options for training and internship for students.

Through observation and measuring, to improve the range and quantity of data gathered to support adaptation in the city. Encouraging community input, through citizen science projects to help capture information. Local observers well placed to notice changes in their surroundings.

Action areas:

4.1 Encourage research programmes to address adaptation gaps and build knowledge of adaptation measures that work for Aberdeen. Testing with practical local projects and disseminating the learning.

4.2 Develop adaptation partnership training and placement opportunities for students.

4.3 Encourage volunteers for citizen science projects, to improve data collection on weather and impacts.

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

Goal 14 – Climate aware

As the city continues to change, a clear communication strategy has helped the public understand the need for and benefits of adaptation actions. Successful projects are shared with national and international partners, raising the profile of the city as a centre of innovation.

How will we adapt?

By sharing knowledge and through education and awareness, to build understanding of what climate change means for the city. From information, so people know where to go to get assistance when severe weather hits; to getting people on board with the benefits of adaptation action.

By communicating climate change in a way that resonates with people. Through making use of local art and cultural reflections. Developing publications and training; and linking with local events and initiatives, such as the North East Climate Week.

By exchanging good practice and developing case study information of local adaptation actions, so organisations can learn about what works and what they can do to be better prepared.

By inspiring young people to get involved in Aberdeen's adaptation journey, through promoting uptake of adaptation learning linked to the Curriculum for Excellence, such as Climate Ready Place; Flood Education lesson plans and EcoSchools programme. Linking to practical adaptation projects in schools to engage and inform the next generation.

Action areas:

4.5 Develop and implement an education and information campaign to engage communities, businesses, schools and organisations. Enable these sectors to share knowledge and build long term understanding of adaptation.

4.6 Explore opportunities to use the arts to improve communication and understanding of climate change and to encourage climate action.

4.7 Highlight good practice and produce case study examples of successful local adaptation activity.

4.8 Investigate opportunities to make use of digital solutions for increasing awareness of climate risks and engagement in opportunities and actions.

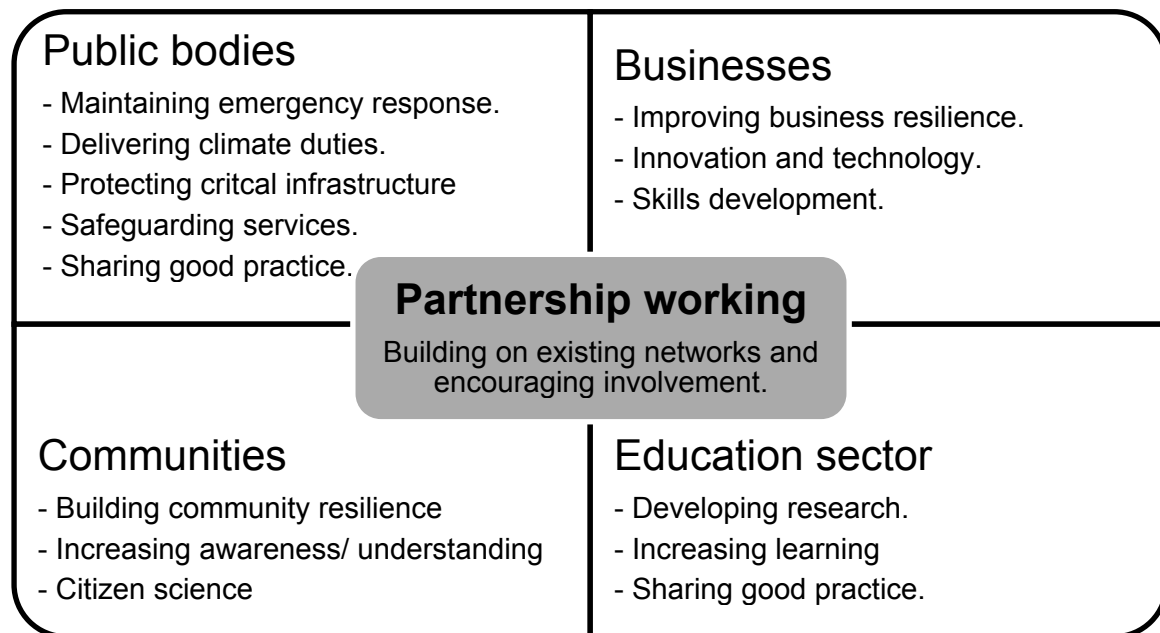
Priority 5

Collaborative working

Community Planning Partnership oversees climate resilience actions in Aberdeen's *Local Outcome Improvement Plan*.

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

The Local Resilience Partnership provide multi agency co-ordination for emergency response and recovery.



Goal 15 - Joined up planning and response

A partnership of public, private and third sector organisations helps develop and monitor the city's adaptation plans, ensuring responses are balanced and efficient. These partnerships extend beyond traditional city boundaries, bringing together organisations across the north east to drive forward a united vision for adaptation that works for all.

How will we adapt?

Collaborative working is the foundation for climate resilience and because of this, it is a cross cutting theme across Aberdeen Adapts. Climate change isn't a challenge affecting one organisation or sector alone. Joint working between organisations, businesses and communities, will be vital to keep the city safe, operating and ready for business in the long term. Collaboration makes best use of resources and avoids a sporadic and inconsistent approach.

By act as a platform for collaboration, pulling activity together, identifying links and gaps and driving forward appropriate action. Ensuring partners are aware and prepared to respond and recover.

By encouraging organisations to integrate climate change in risk registers and business continuity arrangements. Liaising with existing networks to strengthen emergency response.

By considering impacts for the region.

While Aberdeen Adapts has a city focus, there is a need to consider the city region perspective 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 means some climate impacts are shared.

By maintaining 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.

By learning from others, Aberdeen Adapts will investigate opportunities for collaborations with similar cities, that have developed solutions to their own climate challenges.

Action areas:

5.1 Develop and maintain governance and leadership for Aberdeen Adapts, to co-ordinate activity and inform policy.

5.2 Develop a resource of local climate adaptation information, that can be shared with Aberdeen Adapts networks and the wider public.

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

5.4 Assess the impacts of severe weather conditions on the city.

5.5 Identify the impacts of climate change on contingency planning and city priorities.

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

5.7 Support emergency response and recovery arrangements through the Local Resilience Partnership. Investigate pressure from climate impacts in emergency planning.

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.
Air frost	Occurs when the temperature at 1.25 metres above the ground falls below 0°C.
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	The movement of riverbed sediment associated with fast flowing water against a 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.”
Coastal flooding	Flooding from high sea levels, this can be through a combination of high sea levels and stormy conditions.
Coastal erosion	Coastal retreat or loss of materials from the shoreline.
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.
Drought	Result of rainfall significantly below normal recorded levels, causing serious hydrological imbalances that often adversely affect land resources and production systems.
Extreme weather event	The occurrence of a weather or climate variable above (or below) a threshold value near the upper (or lower) ends of the range of observed values of the variable.
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.
Landslide	A mass of material that has slipped downhill by gravity, often assisted by water when the material is saturated; the rapid movement of a mass of soil, rock or debris down a slope.
Non-native species	Invasive non-native species are those that have been transported outside their natural range and that damage the environment, economy, our health and the way we live.
Resilience	Capacity to cope with a hazardous trend or event.
Sea level rise	Above average rise in sea level over a period of time.
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

	<p>meteorological conditions (low atmospheric pressure and/ or strong winds). Excess above the level expected from tidal variation alone at that time.</p>
Surface water flooding	<p>Occurs when an extremely heavy downpour of rain saturates the urban drainage system and the excess water cannot be absorbed.</p>
Sustainable Urban Drainage Systems (SUDS)	<p>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.</p>
Swales	<p>Can refer to a natural landscape feature or one designed to manage water run-off.</p>
Urban Heat Island Effect	<p>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.</p>

Appendix 1

Legislation/ drivers

- EU Adaptation Strategy
- EU Water Framework Directive
- EU Floods Directive
- The Habitats Directive
- Climate Change Scotland Act 2009
- UK Climate Change Risk Assessment
- Climate Ready Scotland: Scottish Adaptation Programme
- Flood Risk Management (Scotland) Act 2009
- Civil Contingencies Act (2004)
- National Planning Framework
- Planning etc (Scotland) Act 2006
- Land Use Strategy

Policies & Frameworks

- National Planning Framework for Scotland
- Scottish Planning Policy 2014 – including Planning Advice Notes on water and drainage and Planning and Sustainable Urban Drainage systems
- Scottish Soil Framework (2009)
- North East Flood Risk Management Plan

Buildings & infrastructure

- Building Standards
- Design Manual for Roads and Bridges
- Maintaining Scotland's Roads

Local

- Local Housing Strategy
- Aberdeen City and Shire Strategic Development Plan
- Aberdeen Local Development Plan
- Aberdeen City Council Building Performance Policy
- NESTRANS Regional Transport Strategy
- Local Transport Strategy
- Powering Aberdeen
- City Centre Masterplan

Nature

- Scottish Biodiversity Strategy 2006
- Scottish Forestry Strategy 2006
- Marine (Scotland) Act 2010
- Greening the NHS

Local

- Aberdeen Nature Conservation Strategy 2010-2015
- Aberdeen Open Space Audit & Strategy 2011-2016
- Dee Catchment Management Plan
- River Basin Management Plan
- Proposed Trees and Woodlands Strategy

People & Economy

- EU Noise Directive
- EU Air Quality Directive
- Community Empowerment Bill

Local

- Air Quality Action Plan
- Regional Economic Strategy
- Refreshed Local Outcome Improvement Plan 2016-26
- Community Risk Register
- Strategy for an Active Aberdeen 2016-2020
- NHS Grampian Local Delivery Plan
- Aberdeen City Waste Strategy
- Proposed Granite City Growing

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 goals

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