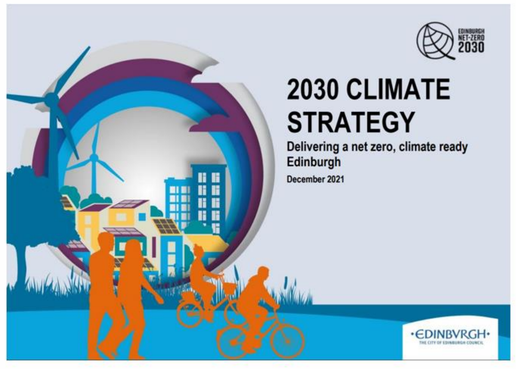
The City of Edinburgh's Climate Change Risk & Adaptation Assessment

Context

The City of Edinburgh Council declared a climate emergency in 2019.

The Council's new *2030 Climate Strategy: Delivering a Net Zero, Climate Ready Edinburgh* sets out how the city will enable, support and deliver action to meet it's net zero ambition and at the same time adapt to the impacts of climate change.



Atkins' Scope

Atkins was commissioned to help build the evidence base and inform the development of Edinburgh's next adaptation programme

- High-level climate risk and adaptation assessment, building off and drawing together previous work and analysis
- Stakeholder workshops to engage with organisations across the city and across Scotland
- Climate risk mapping to spatially demonstrate exposure to climate hazards
- Examples highlighting costs and impacts of climate change, and good practice for adaptation
- Extended case study demonstrating the costs and benefits of nature-based solutions for flooding

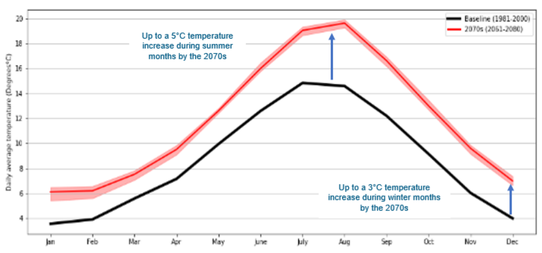
Key climate risks facing Edinburgh

- Heavy rainfall & surface water flooding
- River & coastal flooding
- Storms (wind, lightning, snow)
- High temperature & heatwaves
- Landslides, erosion, & subsidence
- Drought
- Sea level rise & coastal erosion
- Ecology / phenology change
- Air quality impacts
- Wildfires

Impacting people, homes, businesses, communities, species, habitats, infrastructure, hospitals, schools etc. across the city & economy

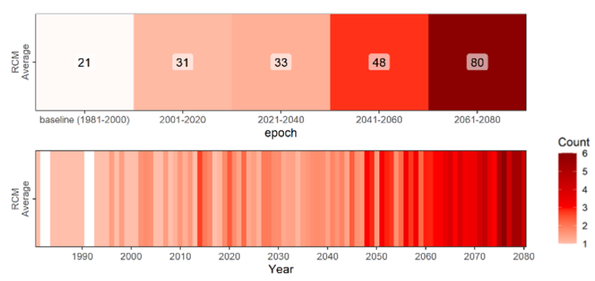
Temperature Rise

Projected average monthly temperatures for the baseline and future period (2070s) under the high emissions scenario (RCP8.5)



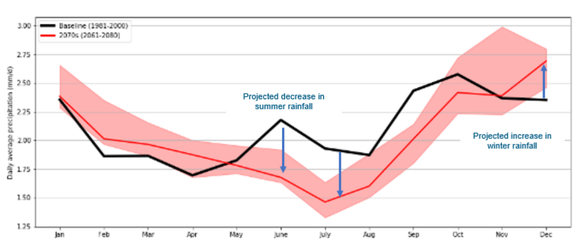
Heat Risk

Projected Increase in Heatwave Events Under a High Emissions Scenario
The likelihood of heatwaves in 2080 could increase by a factor of 4 or more



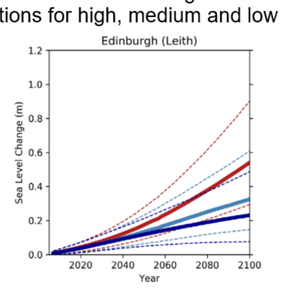
Precipitation Change

Projected daily average precipitation for the baseline and future period (2070s) under the high emissions scenario (RCP8.5)

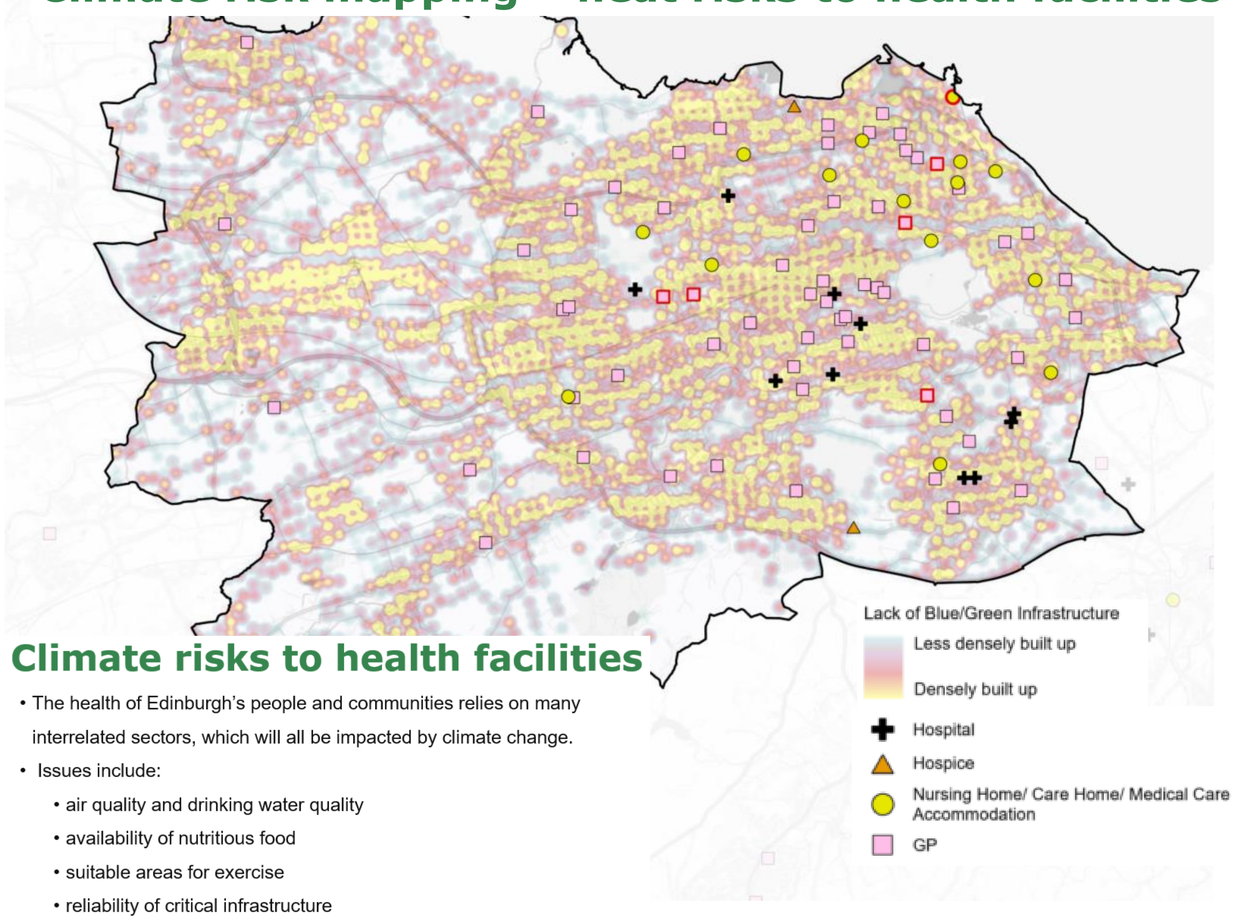


Sea Level Rise

Sea level rise to 2100 using the UKCP18 probabilistic projections for high, medium and low emissions scenarios



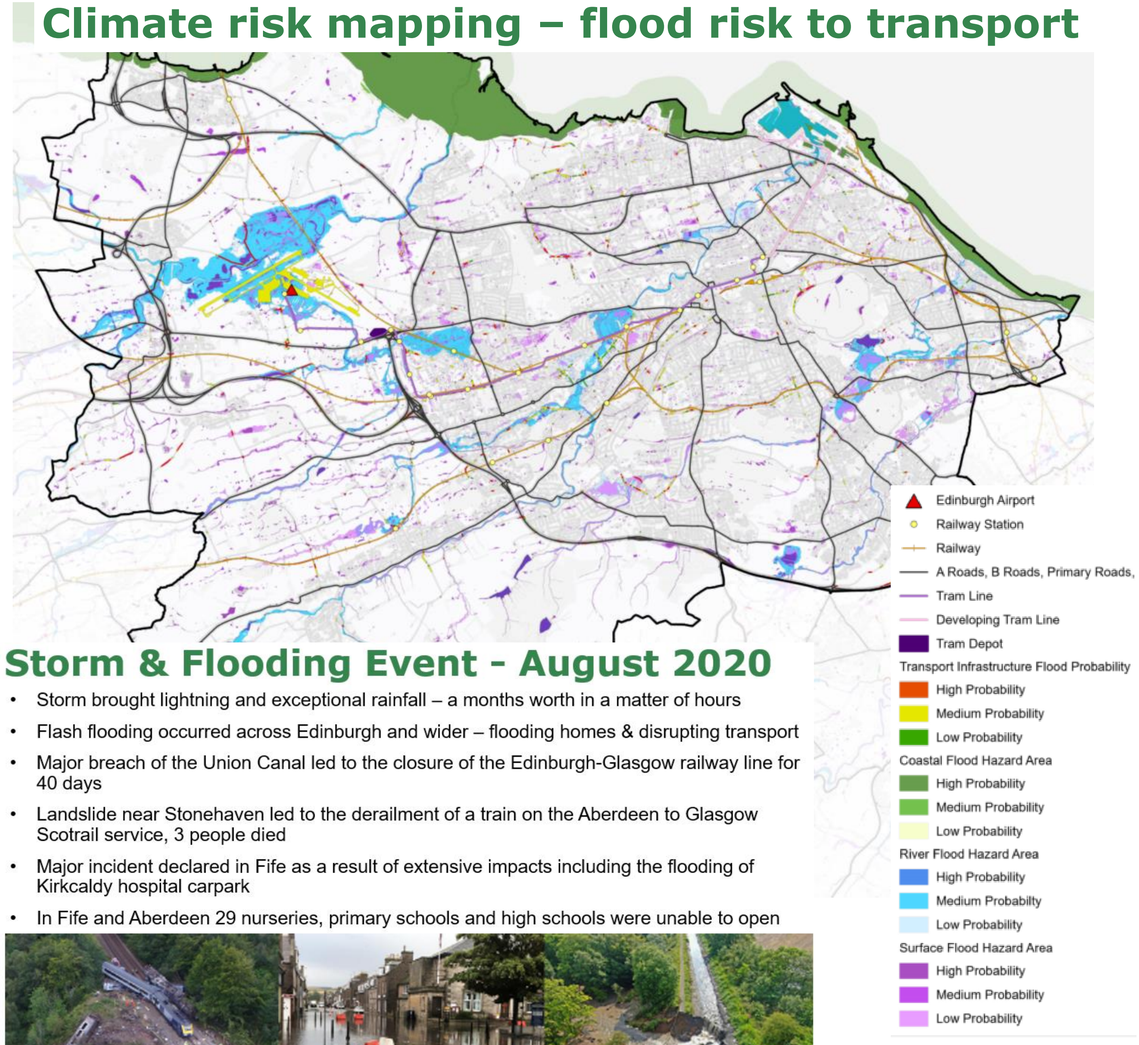
Climate risk mapping – heat risks to health facilities



Climate risks to health facilities

- The health of Edinburgh's people and communities relies on many interrelated sectors, which will all be impacted by climate change.
- Issues include:
  - air quality and drinking water quality
  - availability of nutritious food
  - suitable areas for exercise
  - reliability of critical infrastructure
  - quality of the natural environment
  - accessibility of medical facilities
- Addressing climate impacts to health requires a cross sector approach, and prioritisation for marginalised and vulnerable people.

Climate risk mapping – flood risk to transport



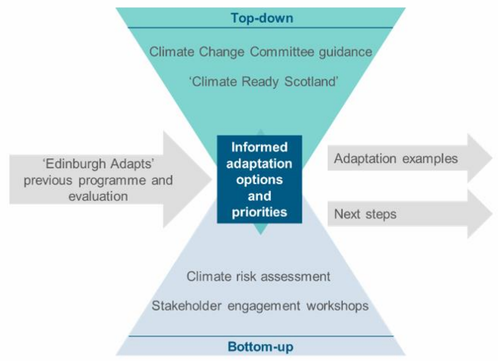
Storm & Flooding Event - August 2020

- Storm brought lightning and exceptional rainfall – a months worth in a matter of hours
- Flash flooding occurred across Edinburgh and wider – flooding homes & disrupting transport
- Major breach of the Union Canal led to the closure of the Edinburgh-Glasgow railway line for 40 days
- Landslide near Stonehaven led to the derailment of a train on the Aberdeen to Glasgow Scotrail service, 3 people died
- Major incident declared in Fife as a result of extensive impacts including the flooding of Kirkcaldy hospital carpark
- In Fife and Aberdeen 29 nurseries, primary schools and high schools were unable to open

Key Climate Risks for selected sectors in Edinburgh

Sector	Key Current & Future Risks	Key Emerging Risks
Built Environment and Housing	Flooding Storms Coastal Erosion	Heatwaves Sea level rise
Transport	Flooding Storms Coastal Erosion	Heatwaves Landslides Drought & Subsidence Sea level rise
Health	Flooding Storms	Heatwaves Drought
Natural Environment	Flooding Storms Coastal erosion	Heatwaves & Wildfires Drought Seal level rise Changes in habitat ranges, species ranges and phenology

Approach to Adaptation Assessment



Examples of Adaptation Measures

	Examples of adaptation measures for heatwaves
Engineered solutions	• Natural and mechanical ventilation for buildings. • Operational measures (e.g. slowing trains in heatwaves).
Nature-based solutions	• Natural shading of buildings. • Green and blue infrastructure to reduce urban heat.
Emerging technologies	• Improvements to monitoring and early warning systems. • Telehealth options to enable access during heatwaves.
Behavioural changes	• Public engagement to increase property-level resilience measures. • Engagement to ensure adaptation measures are accessible to vulnerable groups.
Institutional changes	• Incorporate climate adaptation into standards for planning, design, construction, and operation. • Knowledge sharing with other cities facing heat stress.
Finance and investment	• Develop a dedicated strategy for attracting investment for adaptation. • Incorporate natural capital accounting when appraising options.
Data and understanding	• Modelling accounting for climate change to inform decision-making. • Allow open access to data on climate risks and adaptation.

Adaptation Priorities

Finance and Investment	Data and Understanding	Awareness and Communication	Partnerships
Develop a dedicated strategy for attracting investment for adaptation; increasing range of instruments/funds now available.	Build the evidence base for key gaps such as city-wide heat risk, erosion hotspots, and the impact of changing wind/rain combinations.	Co-create a positive vision for what 'Resilient Edinburgh' looks like, and the benefits it would bring – this could galvanise the city around the 'Race to Resilience'	Support for a secretariat or coordination role – existing groups like Edinburgh Adapts if possible. Possible models: Climate Ready Clyde, Bristol Green Capital Partnership
Increase access to finance for adaptation for local organisations to be able to collaborate and experiment.	Programme of pilot projects with key partners to actively learn from experimentation across the city.	Specific focus on awareness and engagement for marginalised groups so that their views and concerns are included in decisions.	Structures for partnership and collaboration need strengthening.
Inclusion of natural capital accounting and multiple benefits when appraising and assessing projects.	Open data on climate risks and adaptation for organisations across the city to use	Integration of climate risk assessment across city activities, including planning and development	Private sector partners in key sectors like construction, transport, housing etc should be a key priority.

Removing Barriers to Action

Stakeholders in the workshops identified key areas for removing barriers to action:

- Mainstream adaptation into planning & decision making
- Increase budget flexibility, avoid siloed spending
- Influence government and key stakeholders and incentivise action across public and private sectors
- Allocate sufficient resources to drive adaptation across sectors
- Align with actions for Net Zero, avoid maladaptation and misalignment
- Enhance collaboration and build capacity for climate resilience across organisations

Next Steps

- Development of Edinburgh's next adaptation plan, prioritising actions identified by the risk assessment and through working with partners across the city
- Atkins has identified funds which the Council and partners could apply for to help take forward the climate adaptation work. Currently exploring how support can be provided to assist the Council to submit funding applications.
- Key focus areas to take forward the climate adaptation assessment, pending additional funding:
  - Identifying and prioritising specific locations across the city based on climate risk and vulnerability of people, natural assets, and built assets
  - Further engagement across sectors, noting some sectors were not well represented in the climate risk assessment workshops e.g. businesses/ private sector
  - Economic analysis on the costs and benefits of adaptation measures in specific locations / contexts
  - Action planning and programme design for climate adaptation

Atkins: Francis Heil – Associate Director - Climate Change & Resilience
City of Edinburgh Council: Fiona MacLeod - Senior Policy and Insight Officer, Julie Waldron - Senior Landscape Planner