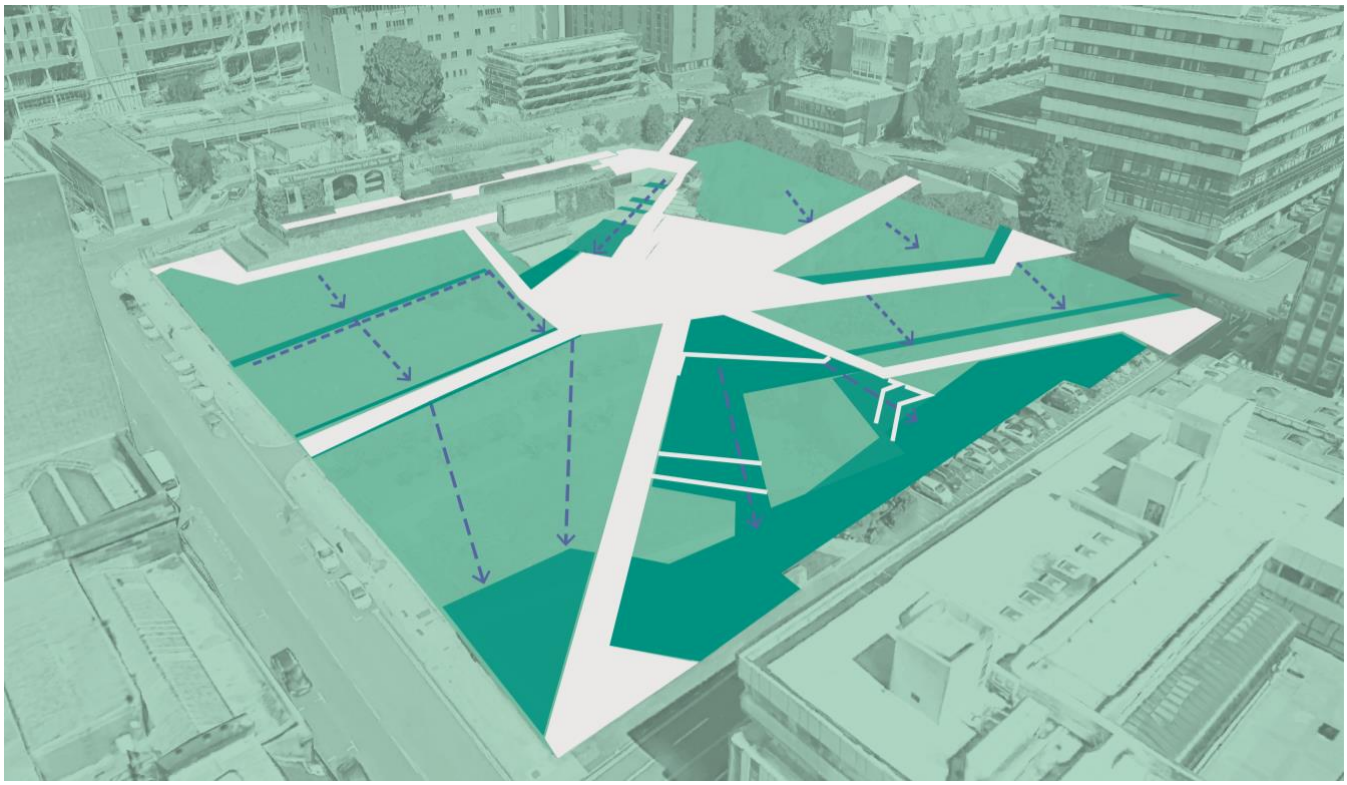
PROFESSIONAL SERVICES | ESTATES SERVICES

University of Strathclyde Glasgow



University of Strathclyde Climate Change Adaptation Plan

SUSTAINABLE STRATHCLYDE

LAST UPDATED JUNE 2021

What is Climate Change Adaptation?

The UK Government supports international targets to limit our greenhouse gas emissions so that global warming does not exceed 1.5ºC above pre-industrial levels[1]. However, even if this target is reached, the global climate will still rise by a further 0.5ºC and the adverse impacts of this will be felt throughout Scotland. Climate adaptation aims to safeguard people, property and infrastructure from these adverse impacts through directing investment to localised adaptation strategies; implementing new building technology and through creating intersectional partnerships[2].

Successful climate adaptation would help the university meet its **strategic goals** in five ways.

I. **Outstanding student experience:** The student experience will be enhanced through ensuring building comfort levels are maintained as annual temperatures increase.
II. **Internationally-leading research:** Through building on Strathclyde's current work on climate-ready cities, academic staff can be supported to produce world leading climate adaptation research.
III. **World-leading innovation and impact:** As Strathclyde's Innovation District grows, this research will help to facilitate connections with industry to deliver impact throughout the urban planning sector.
IV. **Global engagement:** The university has many international links which creates the opportunity to learn from and share experiences in climate adaptation with many other countries and cultures.
V. **Operational excellence:** One of the most noticeable aspects of adaptation will be seen in infrastructure and, as Strathclyde's estate becomes climate ready, higher levels of operational excellence will be delivered.

Front cover: Planned integration of rain gardens into the University's 'Heart of the Campus' project

[1] https://www.tandfonline.com/doi/full/10.1080/13549839.2016.1216954

[2] https://www.ipcc.ch/site/assets/uploads/sites/2/2019/02/SR15_Chapter4_Low_Res.pdf

Policy and Legislative Context

The following policies are encouraging the university to positively respond to climate change adaptation.

Climate Change (Scotland) Act 2009[3]

The Climate Change (Scotland) Act 2009 established the Public Bodies Climate Change Duties which came into force on 1 January 2011. It requires that Public Bodies exercise their functions:

- in a way best calculated to contribute to deliver the Act's emissions reduction targets;
- in a way best calculated **to deliver any statutory adaptation programme**;
- in a way that it considers most sustainable.

Building (Scotland) Regulations 2004[4]

These regulations prescribe functional standards for buildings. They apply to construction, conversion and demolition of buildings and also to the provision of services, fittings and equipment in or in connection with buildings.

Climate Change and Social Responsibility Policy[5]

The University of Strathclyde is committed to reducing its environmental impact by mitigating carbon emissions and adapting to climate change.

University Biodiversity Policy[6]

The University of Strathclyde recognises that our land and property assets encompass a range of habitats and species, with opportunities to conserve and enhance biodiversity.

Socio Economic Impact and Community Benefits Strategy[7]

The University of Strathclyde has put in place a process that adds value across its campus and the City of Glasgow. This is achieved by leveraging its £100 million per annum spend on goods, works and services and the capital investment programme funding to include community benefits in all appropriate contracts.

Sustainable Construction and Refurbishment[8]

All new and refurbished University buildings must demonstrate exemplary sustainable design. 'Business as Usual' is not an option.

[3] https://www.legislation.gov.uk/asp/2009/12/contents
[4] http://www.legislation.gov.uk/ssi/2004/406/contents/made
[5] https://www.strath.ac.uk/sustainablestrathclyde/climatechange/
[6] https://www.strath.ac.uk/media/ps/estatesmanagement/sustainability/sustdocuments/UoS_Biodiversity_Policy.pdf.pagespeed.ce.Rb5_9TsMbX.pdf
[7] https://www.strath.ac.uk/media/ps/purchasing/procurementmanual/Socio_Economic_Impact_and_Community_Benefits_Strategy_200318.pdf.pagespeed.ce.018esqse9A.pdf
[8] https://www.strath.ac.uk/sustainablestrathclyde/policyguidelines/construction/

How Will Climate Change Impact Scotland?

Based on the current climate change and projected best-case scenario impacts of a further 0.5ºC of warming, there are five main ways in which aspects of Scottish infrastructure and communities could be impacted:

- **Public Health:** As a changing climate can cause prolonged heatwaves, flooding and severe storms in Scotland, protecting the mental and physical health of Scots is a priority. Adaptation efforts can support this through directing resources and expertise to the right places in preparation for increased climatic change in future.
- **Local/National Culture:** A large part of the authentic traditional Scottish culture which is so widely celebrated today originates from long-lasting connections with natural landscapes, particularly in low-lying parts of the Highlands and Islands. As sea levels rise and storminess increases, adaptation will be crucial in safeguarding culture in these areas.
- **Social Issues**: A changing climate has the power to further exacerbate ongoing social issues. For example, people experiencing homelessness, poverty or those who are refugees are particularly exposed to impacts of climatic change. Therefore, investing time, funds and resources in these areas will support adaptation by increasing the adaptive capacity of Scottish people.
- **Financial Security:** Infrastructural damage can occur when environmental hazards such as flooding and extreme weather exert adverse stress on buildings and various assets. As such damage can cause huge financial loss, successful adaptation and pre-planning can help organisations save money as the climate continues to change.
- **Operational Infrastructure:** Transport and communications systems are crucial in connecting communities and organisations across Scotland's diverse landscape. Impacts of our changing climate such as flooding and landslides have the potential to damage this operational infrastructure. Therefore, adaptation is important for ensuring that travel and communication, particularly with more remote communities, is not adversely affected by further climatic change.

How will Climate Change Impact Glasgow?

In the West of Scotland it is predicted that our climate will change considerably over the next 80 years.

Already, over the past 43 years, significant trends have been identified in Scotland for instance.

- average rainfall has increased by 21%;
- maximum temperatures have increased on average by 1.21°C;
- the number of heat waves is up by 6 days; and
- snow days have decreased by 32%.[9]

Table 1 illustrates the anticipated changes in climate for Scotland's Cities by 2050.

[9] https://www.glasgow.gov.uk/CHttpHandler.ashx?id=7272&p=0

Climate Impact Categories	Climate Indicators	Change by the 2050's						
		Aberdeen	Dundee	Edinburgh	Glasgow	Inverness	Perth	Stirling
Sea level rise	Increase in extreme tide levels	↑0.26m	↑0.24m	↑0.24m	↑0.23m	↑0.24m	↑0.24m	↑0.23m
Fluvial flooding	Increase in severity of 1:100 annual chance flood event	↑1:180 severity	↑1:200 severity	↑1:200 severity	↑1:220 severity	↑1:190 severity	↑1:200 severity	↑1:200 severity
Pluvial flooding	Increase in severity of 1:100 annual chance flood event	↑1:220 severity	↑1:220 severity	↑1:220 severity	↑1:220 severity	↑1:220 severity	↑1:220 severity	↑1:220 severity
Drought	Reduction in hydrological water availability (high vulnerability)	↓18%	↓18%	↓20%	↓22%	↓21%	↓23%	↓22%
Storms and High winds	Potential increase in severity of 1:20 annual chance extreme gust (Projections less well understood)	↑1:50 severity	↑1:50 severity	↑1:50 severity	↑1:50 severity	↑1:50 severity	↑1:50 severity	↑1:50 severity
Heat wave	Potential increase in the chance of a heatwave in any one year from almost negligible at present to	↑1 in 30	↑1 in 10	↑1 in 10	↑1 in 3	↑1 in 12	↑1 in 4	↑1 in 4
Extreme cold spell	Reduction in number of frost days per year. Reduction in number of heating degree days per year.	↓33 ↓44	↓33 ↓48	↓32 ↓50	↓23 ↓56	↓29 ↓47	↓32 ↓49	↓34 ↓51
Tourist/ growing season	Increase in summer growing (tourist) season days. Reduction in winter period days	↑35 ↓40-50	↑35 ↓30-50	↑40 ↓30-50	↑40 ↓30-50	↑35 ↓30-50	↑35 ↓30-50	↑40 ↓30-50

Table 1 - Climate Change Projections by City - Change by 2050s[10]

How Will Climate Change Impact the University of Strathclyde?

The University is already experiencing the impacts of a changing Scottish climate. In February 2018 The so-called "Beast from the East" storm brought exceptionally wintery weather to Scotland. This extreme weather event caused the University to close for several days for safety measures.

Our Ross Priory site, on the shores of Loch Lomond, has also experienced several flooding events due to heavier than usual rainfall.

In November 2015, a Climate Change workshop was conducted within the University to raise awareness of the issues relating to climate change adaptation with respect to the University's estate and its environs. The outcomes of this workshop can be seen in Table 2. The three risk areas that are likely to present the biggest challenges in a changing climate, as identified in that workshop, are:

1. Buildings need to be fit for purpose in a future climate.
2. Climate change will affect health and wellbeing of individuals and communities.
3. Effective land use management and development planning has a critical role in adapting to climate change

[10] https://www.scottishcities.org.uk/site/assets/files/1104/low_carbon_resilient_cities_-_investment_opportunities_for_better_growth.pdf

In order to engage staff with the issue of climate change a workshop was set up in 2015. One output of the workshop process is a better understanding of the risks and impacts of a changing climate on our buildings, now and in the future. This example is based around our new Learning and Teaching Building which is currently under construction

Risk Area	Issues	Solutions	Risk Level (H,M,L)
Buildings need to be fit for purpose in a future climate	Intense rainfall; wind and storm patterns; overheating	Rainwater attenuation; external fabric works; natural ventilation; shading; insulation.	M
Climate change may damage and disrupt national infrastructure	Flooding; snow; ice; landslides; drought; heat waves; rising sea/loch levels. Disruption to energy, transport, water, ICT networks	Winter preparedness; weather alerts; flexible working; back-up generation; rainwater attenuation devices.	L
Rising Sea and Loch levels	Increased runoff causes watercourses to overflow and loch levels to rise, causing shore erosion e.g. Ross Priory.	Flood risk assessment. Protection works to reduce erosion and protect from water ingress.	L
Natural environment impacts	climate change will transform habitat and biodiversity adding to existing pressures.	maintain green networks and wildlife corridors. Encourage habitat in suitable areas.	L
Productivity of agriculture and forestry will change	Warming climate has the potential to improve growing conditions but greater rainfall events or droughts may cause widespread disruption. May impact price of foodstuffs.	Improved land and water management. Use of local supplies and food networks where practicable.	L
Climate change will affect health and wellbeing of individuals and communities	A warmer climate may provide opportunities to enjoy a healthy, active outdoor lifestyle as well as reducing winter mortality. However, more disruptive weather events impact negatively on certain individuals. Patterns of disease may change.	Improved assurance of health and well-being of staff and students. Screening for contagious diseases. Carer support. Stress advice and monitoring.	L/M
Demands on emergency and maintenance services will change	Emergency crews or maintenance teams may have to respond to weather-related events e.g. flooding, snowfall.	Winter preparedness; Security controls; street clearing and gritting controls; flood risk management controls.	L
Effective land use management and development planning has a critical role in adapting to climate change	Planning can help ensure resilience to climate change impacts such as increased runoff of water.	CC adaption integrated within development planning, green spaces and building design.	M

Table 2 - Estates Services Climate Change Workshop Outcomes

In order to better understand the vulnerability of our buildings to climate change we have begun to conduct climate resilience assessments of our major capital developments. The assessment tool used for this was developed in collaboration with Sniffer[11] and Climate Ready Clyde[12]. Figures 1 and 2 below illustrate the site's vulnerability to climate change, now and in 2050, for our Learning and Teaching Building currently under construction in Glasgow city centre.

The Climate Change projections for Glasgow shown in Table 1 account for the increase in exposure to the climate

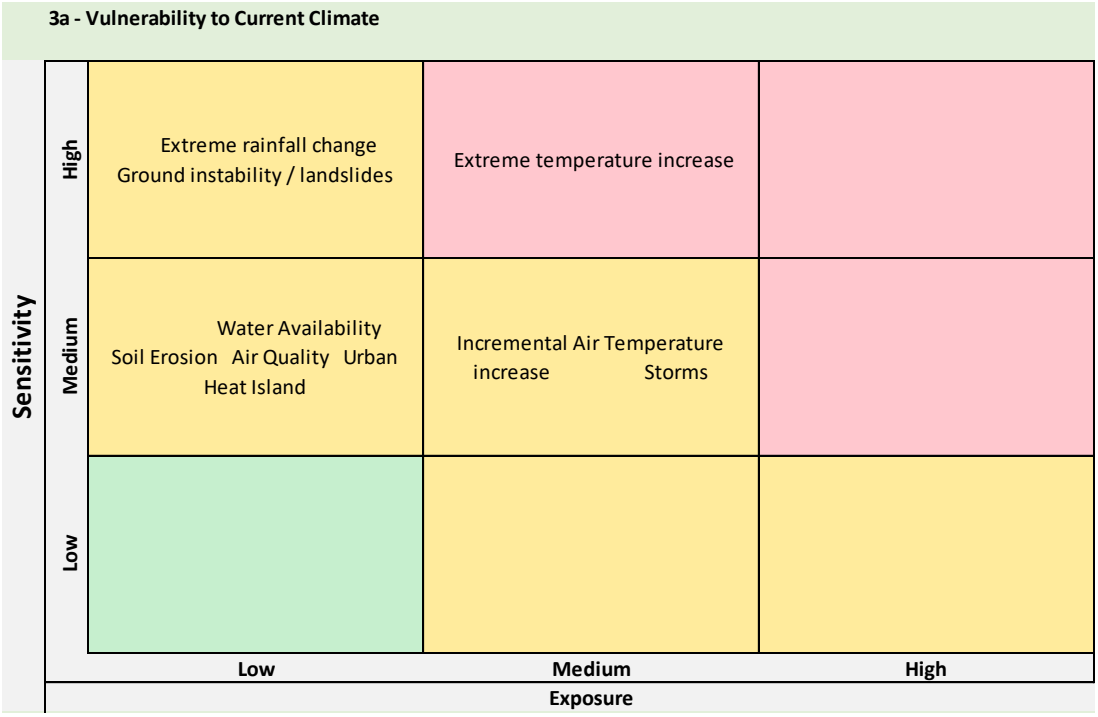


Figure 2 - Learning and Teaching Building Current Vulnerability Matrix

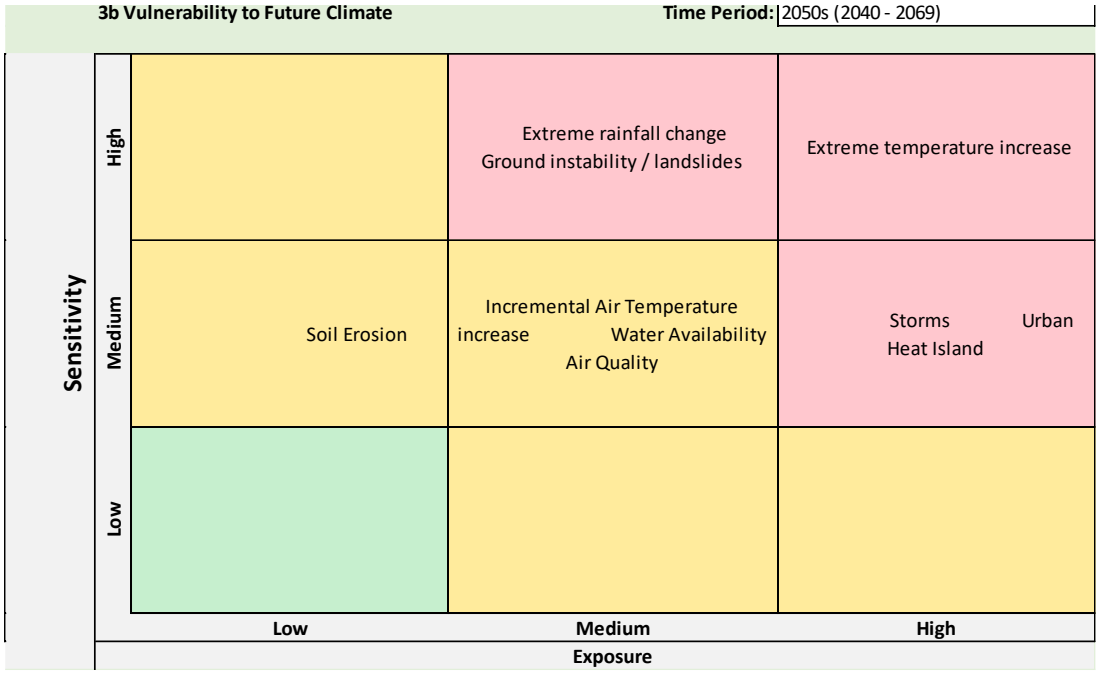


Figure 1 – Learning and Teaching Building 2050 Vulnerability Matrix

hazards listed in Figures 1 and 2. In particular the risk of extreme rainfall change, extreme temperature increase, ground instability, storms and urban heat island effect become particularly pertinent to University activities.

[11] https://www.sniffer.org.uk/
[12] http://climatereadyclyde.org.uk/a-changing-climate-for-development-a-toolkit-for-assessing-climate-risks-for-built-environment-and-infrastructure-projects/

Vulnerability of Our Estate

Spanning four Local Authority areas and one national park, the University of Strathclyde's facilities have a wide range of different buildings, sports fields and teaching and research infrastructure. Each of the five parts of Strathclyde's estate will become vulnerable to climate change in particular ways:

- **John Anderson Campus**: As an urban campus, the main teaching and research centre of the university is comprised of a series of buildings in Glasgow City Centre. The main risks from a changing climate here come from extreme rainfall and high temperatures. This could be made worse by the urban heat island effect. (Glasgow City Council)

- **Advanced Forming Research Centre (AFRC):** Based near Glasgow International Airport, this design and manufacturing research centre houses advanced technology which is crucial to the international work of Strathclyde. Given the low lying nature of the area, sea level rise and increased storm surges might impact the tidal watercourses in this area. (Renfrewshire Council)

- **Power Networks Demonstration Centre (PNDC):** PNDC is located on the outskirts of Cumbernauld and comprises of a single building and outdoor energy network simulation structures. Whilst drainage is one of the main vulnerabilities to climate change here, this is managed by a local Sustainable Drainage System (SuDS) attenuation basin. (North Lanarkshire Council)

- **Stepps Playing Fields:** The Strathclyde University playing fields are located in Stepps. Although there would be a potential for flooding from nearby lochs during periods of high rainfall, these lochs are controlled by pumps as part of the management of the Seven Lochs Wetland Park which reduces the risk of flooding. (North Lanarkshire Council)

- **Ross Priory:** On the banks of Loch Lomond, the historic building and grounds of Ross Priory serve as a conferencing and events venue for the university. The proximity to the loch and remote location make the site vulnerable to the potential impacts of flooding during times of increased rainfall and to reduced access during storms. (West Dunbartonshire Council and Lomond and the Trossachs National Park)

How is the University Adapting to Climate Change?

The University of Strathclyde is committed to incorporating awareness of the risks posed by climate change and how to successfully adapt into several aspects of organisational policy and operations:

- **Soft Landscaping:** The University is seeking to maintain as much 'soft' landscaping as possible to reduce the need for purpose-built attenuation systems. This has been done through the implementation of wildflower gardens in the pedestrianised space outside the Library and Sports Centre.
- **Design of Capital Projects:** Where appropriate, elements of green infrastructure such as rain gardens and building services such as temperature control are incorporated into plans from an early stage of design. An example of this is the incorporation of raingardens in the plans for the new Heart of the Campus development in Rottenrow Gardens.
- **Retrofitting:** For existing buildings and infrastructure, we will retrofit elements of green infrastructure such as mini rain gardens. This will be done by proactively seeking out appropriate opportunities within our estate.
- **Monitoring and Reporting:** We will measure and monitor the following aspects: 1) m^2/acreage of soft landscaping on the university estate, 2) The relative change in percentage of soft and hard landscaped areas. Reporting is currently achieved via the Public Bodies Reporting for Climate Change and through the Sustainability Leadership Scorecard and Adaptation Scotland's Benchmarking Tool.
- **Preparedness:** Staff engagement is key in promoting an awareness of the hazards posed by climate change and how to adapt to them. The university is committed to involving as many students and staff in these discussions as possible.

Figure 3 - PNDC SuDS system