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National Trust

Climate Change Adaptation Guidance – People & Visitor Activity

Higher temperatures

Climate change vulnerability: high

Higher temperatures – introduction

People experience heat in different ways and each person will have a different limit when it comes to heat and humidity. Equally, in the United Kingdom there is no legal threshold for overheating applying to human activity, access limits or working arrangements.

In recent years, the UK has seen records for high temperatures smashed. Although people have enjoyed the heat, it also presents a danger to us.

Our buildings, which were mainly constructed before 1919, are usually good at keeping cool in such weather, but data from our historic houses shows that some rooms reached over 36°C in the summer of 2022.

Coupled with the risks from overheating during the day, night cooling can be limited in built-up environments. This is known as the 'urban heat island' effect. Properties in such environments will often continue to experience the effects of overheating through the night and into the following day.

In hotter weather, people are less likely to visit certain types of property during peak hours (11am-2pm). This is particularly noticeable if there is limited shade in outdoor 'dwell spaces' such as playgrounds, picnic areas and seating areas, where visitors tend to linger.

Image credit: Gardener working in the upper garden at Quarry Bank, Cheshire (©National Trust Images/James Dobson).

Higher temperatures – why do they matter?

Visitors, staff and volunteers are all affected by heat. It influences behaviour, mood, levels of activity and performance. It can also be dangerous: under the UK Climate Change Committee's Risk Assessment 2022,[1] excessive heat was highlighted as the number one climate-related risk to human health.

The National Trust has experienced a noticeable change in visitor behaviour when temperatures soar. People still visit our places during heatwaves, but are far more likely to travel to sites with water: rivers, coastal properties and places with lakes.

We have received an increase in complaints about the provision of shade at our places, which is encouraging property managers to think long-term about the need for more tree planting in certain locations. Managers are also having to reflect on the suitability of some of our cafe spaces (in both outdoor and indoor locations), given their aspect and the lack of sun protection in some of our popular food and beverage venues.

All of this matters because we rely on our visitors to meet our core purpose: if people do not visit or do not feel comfortable enough to stay and use our facilities, we will lose crucial income that can be put towards our conservation goals.

It is therefore vital that we adapt our places to take account of the impact of overheating on our visitors, staff and volunteers. This will ensure continued access to beauty, nature and history, and will maintain high levels of visitor support.

[1] UK Climate Change Risk Assessment 2022 https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1047003/climate-change-risk-assessment-2022.pdf

Image credit: Visitors enjoying ice cream at Tarn Hows, Cumbria (© National Trust Images/Chris Lacey).

Higher temperatures – activities, impacts and options

Activity	Impacts	Options
Visitor numbers	Fewer visitors where there is limited access to shade and water; increase in visitors for countryside and coastal sites.	Increase shade provision in key dwell spaces (picnic areas, play areas, rest areas); create more shaded infrastructure, such as main walks; make more of water features; try to reduce pressure on popular hot weather sites.
Dwell time	This can increase or decrease, but the main change is around peak hours with the middle of the day becoming less popular.	Open earlier and/or later, helping to spread the load of the cooler hours.
Visitor behaviour	Change in visitor activity and spend (retail decreasing, food and beverage sales increasing); change in paid for activity and use of dwell spaces.	Create more opportunities to provide cool drinks and snacks, to help people adapt to hot weather; provide more cooling activities; increase safe access to water bodies and associated infrastructure; initiate water-contact activity such as canoeing, boating, swimming opportunities.
Staff behaviour	Health; increased need for frequent breaks; lack of motivation; discomfort.	Consider relocating office spaces to cooler environments; look at passive ventilation options (are windows including sashes able to open and function as designed?); provision of shade; provision of cool break spaces for staff outdoors and indoors (avoiding mechanical cooling as this is not sustainable).
Volunteer behaviour	Health; increased need for frequent breaks; lack of motivation, discomfort; inability to work in the middle of the day.	Provision of shade in volunteer work spaces; amending shifts to avoid the midday sun; provision of water; provision of cool break spaces for indoor and outdoor volunteers.

Higher temperatures – options and thresholds

Due to the lack of legal requirements around high temperatures associated with working conditions and visitor activity, options should be specific to each place and at the discretion of management teams. Below are listed some further detailed explanations of potential adaptation measures for higher temperatures.

Specific options for adaptation to higher temperatures include:

Increasing shade – many of our places are living landscapes which evolve over time. Places often have planting plans for designed parkland or carbon sequestration ambitions, which have strong synergies with tree planting to create shade. If no such plans exist, studies for appropriate planting designs could be commissioned, alongside options for creating shade in areas where dwell time in the sunshine is high (outside cafes, picnic areas, play areas). Tree planting can also reduce the impact of urban heat island effects in more built-up areas.

Opening hours – many sites experience peak visitor numbers at lunch time. As high midday temperatures increase, sites could extend visiting hours and open facilities such as cafes for breakfast/afternoon tea, to enable more visits at cooler times.

Cooling refreshment – provision of more cool drinks/ice creams can offer much-needed refreshment; separating these from principal cafe till points and busy areas can highlight availability and enable easy access. 'Pop-up' refreshment outlets should be appropriately shaded and designed with staff comfort in mind.

Water-related activity – we know that visits to designed parkland decrease in high temperatures; to avoid all audiences drifting off to the beach, we could provide water-related activity to encourage visits to traditional houses and gardens. (This would need various permissions to establish activity such as boating or open water swimming.)

Cool indoor environments – our traditional buildings are generally good at keeping cool. However, upper floors can still be very susceptible to higher temperatures, particularly in south-facing rooms with high proportions of glazing. Cooler work spaces in north-facing rooms, ground floor or cellar-level spaces can offer more comfortable hot weather work environments. Where visitor welcome spaces and facilities are provided in vehicles such as trailers, these are very susceptible to higher temperatures; options to relocate vehicles into shaded areas or to create shade for them should be considered. Mechanical cooling should be avoided wherever possible. While associated permissions/consents are likely to be needed, the introduction of shades, shutters and awnings to built structures, and ensuring that windows can open and function as designed, will all help to reduce heat in the built environment.

Working hours – this option includes looking at amending staff and volunteer shift patterns to allow respite during hotter parts of the day. This can be combined with the provision of cool break-out spaces and enabling easy access to drinking water.

Thresholds & tipping points

At what point might you diverge from your current management strategy? What are the events/factors that may trigger this change of approach?

- Frequency of heat-related absences/health issues
- Visitor complaints (provision of shade/food and beverage options)
- Volunteer and staff satisfaction surveys
- Temperature of working/activity spaces (indoor/outdoor and night time temperatures)*

*Legal frameworks

There is no UK law specifying upper thresholds for safe working environments related to heat or humidity. Where properties determine their own thresholds, we need to be aware that this is not backed up by regulation.

Thresholds should ideally come from proxy impacts such as those flagged verbally, felt in terms of comfort, and in response to frequency of issues arising.

Image credit: Chedworth hypocaust (© National Trust Images/Ian Shaw).

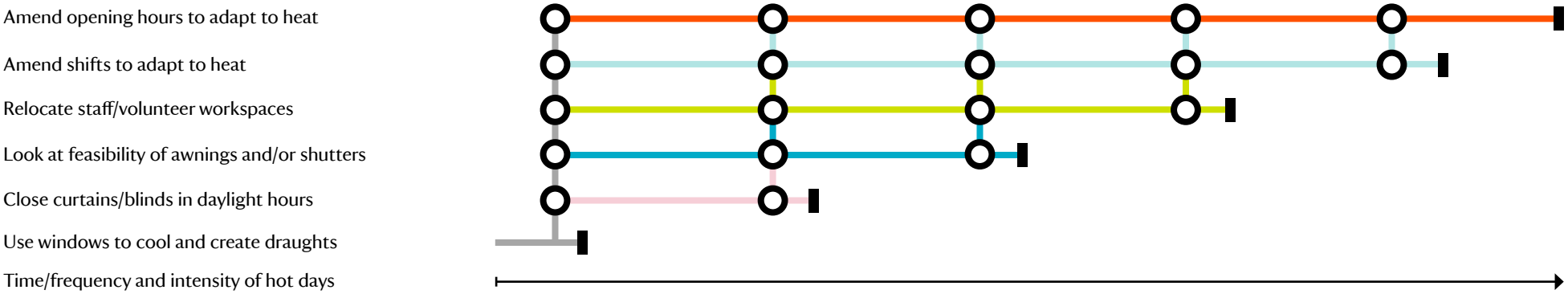
Higher temperatures – worked pathway example

Applying the pathways and thresholds to a real site example: this page shows how and when you might wish to make changes to your adaptive response to climate hazards.

Working with a multi-disciplinary group to think about options and thresholds for a typical site is key. This cannot be done in isolation as there are significant implications for impacts on everything from facilities teams to aesthetics to archaeology. It is always most effective to bring together the right people to work on a mutually acceptable solution for a period of time between thresholds for change.

While the resulting changes may principally be about people and comfort, they are also likely to have an effect on the historic environment and possibly also species and habitats. Therefore, significance should always inform the approach.

Options for adaptation must not be selected in isolation from the unique characteristics, significance, vulnerabilities and use of your specific site. This may mean that different adaptive pathways apply to each site.[2] The worked example below is hypothetical, and is based on the use of top floor office space at Ham House, National Trust. Located in one of the hotter parts of the country, higher temperatures at Ham House can impact staff, volunteers, visitor activity and property opening hours.



(Response thresholds are most likely to be based on personal experiences of room temperature, linked to the associated site operational behaviours. The specific trigger points would need to be agreed by the operations decision-maker and relevant consultants and consultees such as the staff and volunteers working on site.)

[2] Dynamic Adaptive Pathways Approach (Haasnoot, Kwakkel, Walker & Ter Maat, 2013).

Image credit: A child and an adult playing in a stream in the grounds of Florence Court, County Fermanagh. © National Trust Images/ Chris Lacey

Case studies, signposting and references

The following case studies show how overheating is affecting visitors, staff and volunteers at a number of the National Trust's historic and beautiful places across the UK, and how local teams have responded.

Hardwick Hall – in the summer of 2022, the rooms at Hardwick Hall became excessively hot, especially on the upper floors. The team ensured that volunteers swapped locations regularly and took more regular breaks in order to cope with the warm rooms. The heating was also switched off, despite high relative humidity, due to rooms reaching the upper temperature limit on the conservation heating controls. A project is currently underway to look at replacing internal blinds to reduce light levels and heat absorbency of the rooms. This will take on board the climate predictions that have been discussed with the property, which is one of eleven pilot sites for the National Trust's place-based work on exposure and adaptation measures.

Ham House walled garden – the effects of heat felt by staff and volunteers in our garden spaces at Ham House were particularly acute in the walled garden, where there is very little air movement or shade. Most of the space is used for edible plants, with a few fruit trees. To adapt to the heat, volunteering hours and staff shifts were changed so that people came in earlier in the day (from early morning) and finished before the peak heat of the afternoon. These more Mediterranean working hours are likely to become a common way for operating teams to adapt to the heat.

Formby – this is a popular destination during summer months, thanks to its long stretch of sandy coastline and proximity to large urban conurbations. Unfortunately, the car park at Formby was forced to close in 2022 as the shelter for staff and volunteers operating the car park facility became too uncomfortably hot. Before this, operations teams were provided with regular cold drinks and refreshments to ensure that everyone was kept hydrated and refreshed in the heat. The car park is going to be relocated to reduce impacts of dune mobility, flooding and overheating.

Image credit: Volunteers working in the garden at Ham House (© National Trust Images/Chris Lacey).

Image credit: Formby car park suffers from its exposure to coastal processes, flooding and heat (© National Trust Images/Annapurna Mellor).

Signposting & other guidance

The UK Climate Resilience programme has produced a Heat Pack in partnership with the Met Office, UKRI and Belfast City Council. This useful summary pack is a great example of how issues with overheating can be communicated, along with impact, adaptation responses and building long-term resilience to heat. This is also available online as a story map which gives a basic understanding of how to assess vulnerability to heat across places.

The Chartered Institute of Building Services Engineers (CIBSE) has published guidance on avoiding and managing overheating in buildings. CIBSE's TM52 tool to assess thermal comfort is particularly useful when planning to adapt a building or space to a new purpose.

When considering changes to adapt any historic place to heat, there are likely to be many implications for the historic and natural environment. Always **consult a historic environment specialist** (such as a curator and an archaeologist), a natural environment specialist (such as an ecologist), as well as planning consultants, engineers and your local statutory bodies to check the implications of any proposal.