Climate School 180
Temperature Management

Who is this information for?

This guidance document is for whoever is leading your climate adaptation and education project, and for those involved in making any changes to your school grounds.

It provides an overview of how your school ground can be part of your strategy to help you manage the temperature of your grounds and for some buildings.
These changes can also help you when considering the Adaptation and Resilience theme of your Climate Action Plan.

Introduction

Children are affected by temperature rise more than adults. This can impact their wellbeing and significantly reduce their performance in lessons, whilst also reducing their amount of activity at playtime.

If you are in an inner-city school, you will face significant increases in the average temperature, increase in the duration and intensity of heat waves, as well as increases in the urban heat island effect. You will also experience more of these effects the further south and east you are in the UK. However, all areas of the UK will now face a modest peak temperature increase and likelihood of more heat waves. You will need to understand your site and geography to identify if heat is an issue already, or if it is to be a growing issue in the future.



The temperature of both buildings and grounds can be affected by the landscape outside, the type of ground surfaces, the shade and shelter from buildings and other structures, trees and shrubs, as well as the flow of air around the site. All these factors can be changed.

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Sometimes this can be a major change which can be costly but impactful, however, there are lots of things that can be done that can be low cost and easy to implement too. This might include considering what times you use your school grounds for learning and play or where in the site you focus outdoor activities e.g. using only shaded areas at the hottest part of the day, or sunny areas in the winter.

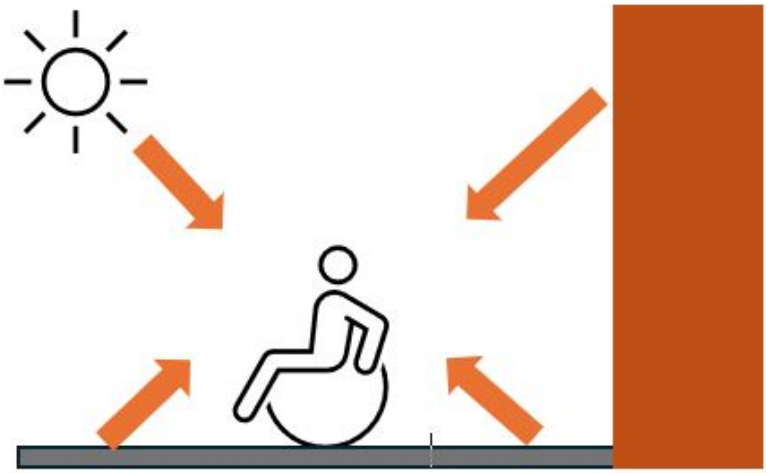
Some of the issues caused by temperature are outside of the influence of the school – such as overly warm night temperatures preventing pupils from sleeping. However, on site you have opportunities to reduce average and peak temperatures significantly through using both nature-based solutions and artificial solutions. In some areas of the world, this has enabled school grounds to become 'cool oases' in the heat of summer for communities as well as the pupils.

How does heat affect your school?

Firstly, there are different types of temperature that can affect us in different ways:

- Air temperature is a measure of how hot or cold the air is
- Surface temperature is how hot or cold a surface is
- Radiant temperature is the temperature radiated by a heat source, such as the sun or the ground and walls

Mean Radiant Temperature is the most relevant for people who are outside on a hot day. This is the heat you feel between the air and hot surfaces – so heat is hitting you from all directions.



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There are other factors that can also make us feel hotter or colder. These include:

- Relative humidity
- Wind speed
- Clothing
- Metabolic heat rate

The temperature inside your school buildings is greatly affected by the temperature outside. So, if you have asphalt right up to the classroom with no shade, and the sun is beating down on this, the combined heat will also make your classroom hotter.



Shade is the most effective way of making you feel cooler. It not only prevents much of the direct heat from the sun but also reduces the amount of heat radiating from surfaces. This means that you will feel cooler in shade on asphalt that you will in full sun on grass, even though grass generally radiates back less heat than the asphalt. Tree canopy cover takes time, and so there is never a better opportunity than now to consider how you can plant for a shady future.

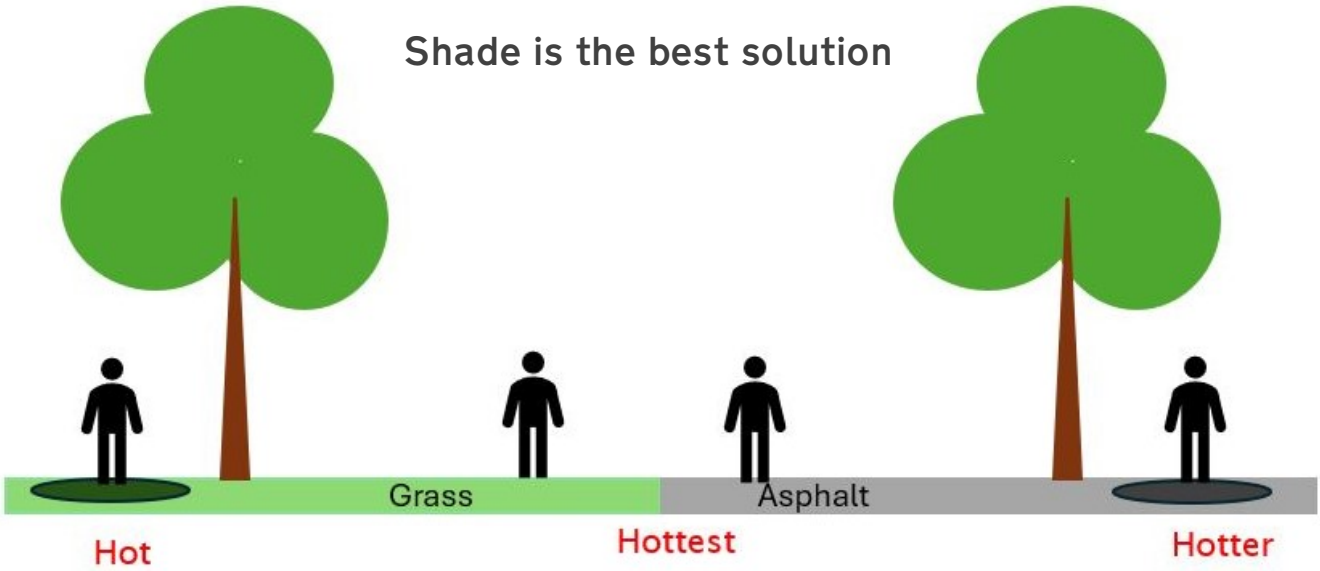


Image based on an image used by V. Kelly Turner during a Schoolyard Forest Design Lecture 2024) hosted by Green Schoolyards America]

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Wind can help reduce temperatures on a site. Planting in the correct way, as well as the introduction of water, can help draw cooler air across a site as wind. Conversely, planting which blocks the wind can increase temperatures significantly.

When looking at the impact of heat on the body it is important to not only look at the external impacts, but also on people's behaviour. When they get too hot, children and young people will tend to move into the shade and reduce their levels of activity. It is worth considering what seating and play opportunities there are in your shaded areas to encourage pupils to stay out of the full sun.

How does cold affect your school?

Our changing climate may bring issues through cold on site. This is through a combination of issues, from cold winds from the north and east, to cold events in the winter (such as the 'Beast from the East') which bring frost and snow. In addition, we will see modest reductions in average temperatures in the north and west of the UK, making the 'average UK day' feel colder.

A cold outdoor area can become a barrier to both learning and play outdoors, with pupils needing to dress more warmly or being reluctant to be outdoors. Additionally, buildings will require more heat to stay warm during cold wind or cold temperature events. Finally, some sites with year-round shade create 'frost pockets' which can cause real challenges on a school site.



While some issues around cold can be solved through culture – loaning or asking families to provide warm outdoor clothing - many require thought around the school environment. Some of the issues can be solved through nature-based solutions or artificial solutions on site, such as using trees which create shade in summer but which drop their leaves for the winter to allow sun into the area. Dense, evergreen hedges and shrubs can block cold winds year-round, and reducing the size of open areas on the school grounds can also slow winds.



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Working through the Learning through Landscapes (LtL) process of change

This simple process of change is a structure LtL encourages schools, and those who work with them, to use. It helps to ensure that schools properly consider their needs before making changes to practice or their grounds. We are using this process as we look at air quality in school grounds and buildings. Use the introductory resource, 'Engaging your pupils from start to finish' to help you plan how your pupils, and others, can get involved in this process of change.



Stage 1: Where are we now?

Use the School Grounds Climate Survey temperature management section and the temperature and wind testing activities to discover where it is too hot or too cold in your school grounds now.

Stage 2: Where do you want to be?

Use your survey information to prioritise where you need change to happen. Don't worry about what that change will be at this stage, that is for the next problem-solving stage. It is important that you don't decide what you are going to do before you've looked at different options. This will help you to slow down and think about what you are trying to achieve and, therefore, which are the best solutions for each situation.

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At this stage you will be looking at the specific needs of your school. This could be parts of the building that overheat, areas of your grounds that are always cold, or spaces that overheat in the summer and are very cold in the winter. So, the answer to this question will be unique to you, as will be the solutions you decide upon.

It is good to have a vision for the whole of your site to work out what are your priorities, so that you start where the need is greatest but then continue once that has been completed.

Stage 3: How can we get

This is the problem-solving stage, the stage where you look at different options for change and where decisions are made.

Once you have a clear idea behind the purpose of your changes, you can begin thinking about how different ways nature-based solutions can help. Start by looking at what you really need for that space – which you will have thought about in the stage prior to this.

For each space or feature, review the options for what you can change using the 'Temperature Management Options for your school grounds' to help you choose the right option for each space. You might come up with solutions as part of a design project, or select plants to grow in science, or as part of a gardening or eco club. Having multiple options will mean you can see what will work and what will not. The solution may end up being a combination of different options and unique to your school.



At this stage, you will also want to think about making sure you are using sustainable resources, ideally from local suppliers, the cost of change and the maintenance implications.

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Stage 4: Making the changes

Once you have decided on the changes, you need to plan who will be involved in making the changes and when this needs to be done e.g. the planting season for trees is in the winter when they are dormant (see trees in school grounds for more information on planting trees).
At the end of 'Temperature Management Options for your school grounds' you will see which how to guides you will find most useful for you.

Then back to: Stage 1: Where are we now?

Whatever you do, remember to go back to see what difference you have made. Do this straight away but also annually, especially if you have included planting in your changes. From here you can start to plan the next thing on your list of priorities.
And don't forget to celebrate change too!

Planning for the future

Any changes you make will have maintenance implications, so start to plan for this right at the beginning of the process. Creating a management plan can be a useful way to do this and the Polli:Nation Maintenance Guide will help you to put this together.





For all other climate change resources, please visit www.ltl.org.uk/climate

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