

Director of Public Health Annual Report

Clean Air and Climate Change

South Gloucestershire, 2022



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Foreword

As I come to the end of my time as Director of Public Health, and a decade at South Gloucestershire Council, I remain amazed by and in awe of, the kindness, resilience, and adaptability within the communities of South Gloucestershire and amongst my colleagues and partners, particularly during the challenging pandemic years.

This strength and flexibility will need to continue to flourish given the ongoing challenges and pressures as a result of the cost-of-living crisis and international uncertainties, including the topic of this report.

I have chosen to focus on clean air and climate change within this report to share work underway locally to combat the challenges that face us all in the years to come, highlighted by this summer's unprecedented heatwaves as an example.

Poor air quality is one aspect of the climate emergency and as overall global temperatures rise, that will have long term consequences for our lives.

South Gloucestershire declared a climate and nature emergency in 2019. My report covers what we know about improving air quality and combatting climate change in South Gloucestershire, what we are already doing, and the ways we might be able to contribute individually and collectively as we plan for the future.

As you read this report, I hope it gives you a clear understanding of the potential health and wellbeing impacts of clean air and climate change in South Gloucestershire and provides you with some tangible ways in which we can prioritise local action.

I'd like to acknowledge the contributions of Dhanya Gardner, Gerard Madden, Rowena Kenny, Barry Wyatt, Lucy Rees, Fionna Vosper, Robert Hayward, and Sarah Weld who supported the development of this report.



Sara Blackmore, Director of Public Health

Introduction

Although both clean air and climate change are influenced by factors beyond the borders of South Gloucestershire, the impact of it is felt in our local populations at all ages and in our coastal and rural communities as well as our urban ones.

This summer, locally and nationally, we have felt the impact of record-breaking heatwaves, and droughts (1), and we know climate change brings with it more frequent extreme weather events which provide tangible impacts of climate change. The level of pollutants in the air we breathe may not always feel tangible we don't always know the level of pollutants in the air just by looking at it, and the impacts are not immediately felt even though poor air quality can harm us with every breath.

Climate change

The Government's third climate change risk assessment (2) (CCRA3) serves as a stark reminder that we are facing real and life-threatening changes to our climate, ecosystem, and to our way of life. CCRA3 sets out that 40°C temperatures were not expected in the UK until after 2040 (2).

However, the highest temperature to ever be recorded in the UK was 40.3°C in Coningsby (Lincolnshire) in July of 2022 (1). The Met Office predicts a change in the UK weather patterns overall, with warmer, wetter winters and hotter, drier summers (3).

CCRA3 identifies 61 risks and opportunities set against a scenario of a 4°C rise in planetary temperatures, far higher than the 2°C limit and 1.5°C target set out in the Paris Climate Agreement (2) (4). A rise in planetary temperatures will

create significant challenges and come with both great financial and human costs.

A 4°C rise will mean sea level rises, more frequent extreme weather events including heatwaves, floods, and droughts, as well as crop failures threatening the availability and affordability of our food, rises in the transmission of some infectious diseases, and financial costs from disruption to essential services, businesses, and damage to infrastructure.

Clean Air

Polluted air can harm every organ, reduce lifespans, and lead to or exacerbate respiratory and cardiovascular diseases (5). Sixty six percent of pollutants in the air we breathe in South Gloucestershire come from UK sources; road transport, industrial and domestic burning of fuel, industrial processes, and agriculture all contribute to poor air quality locally.

Higher particulate matter concentrations including particulates from farming activities can trap heat in the air and contribute to climate change (6).

Transport remains the largest local factor in air quality and is something we can impact individually as well as collectively. However, tackling air quality can be tricky, factors which are beneficial to mitigating climate change such as switching to wood burning for fuel, also releases high concentrations of particulate matter into the air (6).

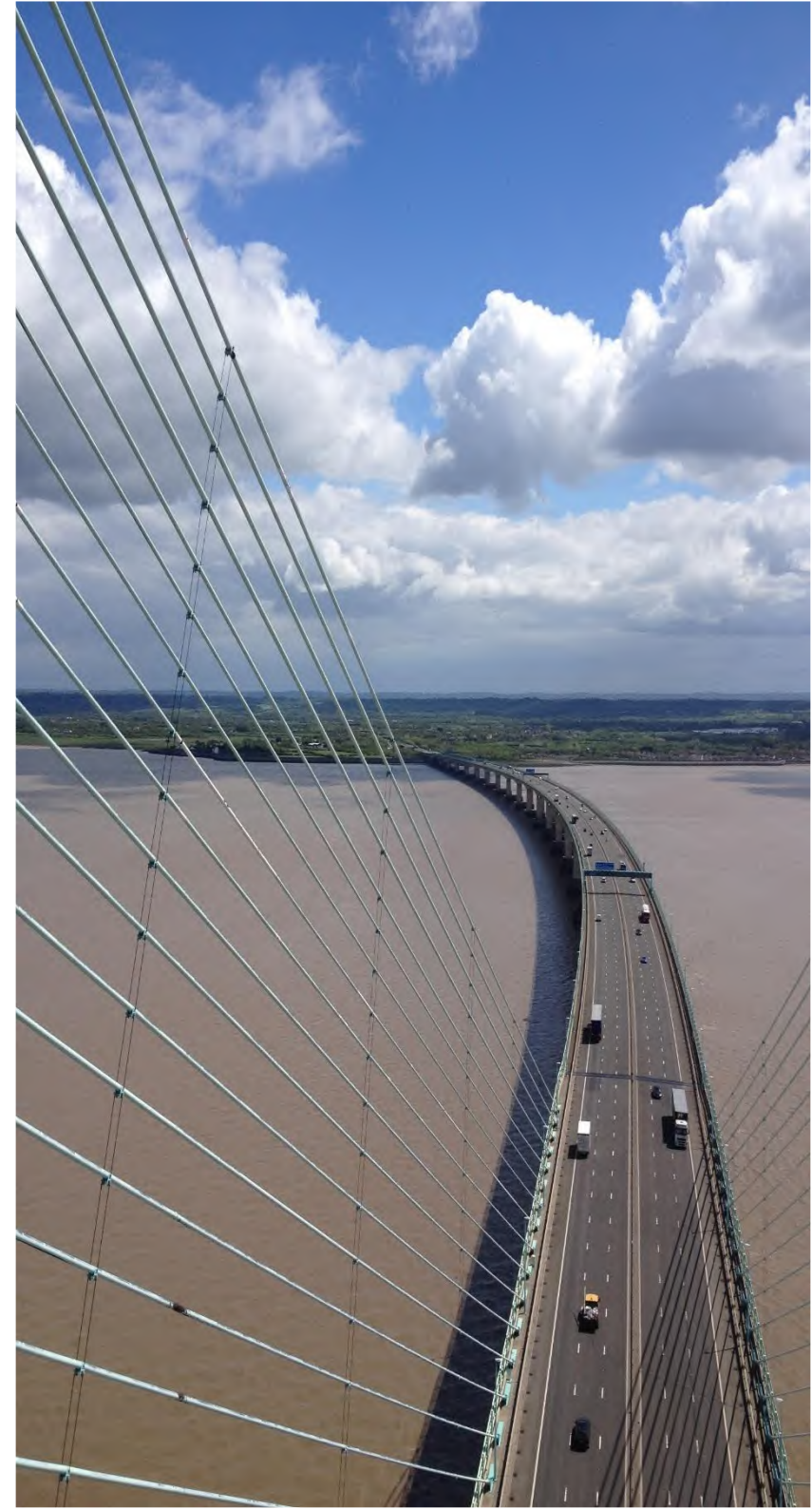
Our Communities

We know the impact of climate change and poor air quality are not felt equally across our society. Some of our most disadvantaged communities are most adversely affected by the impact of poor air quality and climate change and are least able to put in place adaptations to

mitigate the impact due to factors such as cost.

The United Nations Sustainable Development Goals (UN SDGs) are underpinned by the goal of 'leave no one behind' (7).

This report looks at what air quality and climate change mean for South Gloucestershire, and what we are doing, and can do, to prioritise protecting the health and wellbeing of our people and communities.



Clean Air

Air quality is the largest environmental health risk in the UK. It shortens lives and contributes to chronic illness. *DEFRA Clean Air Strategy, 2019* (8)

What do we mean by Air Quality?

Air quality refers to how clean the air is that we breathe. Pollutants in the air can be hazardous to life and can affect the air both inside and outside the home.

The air we breathe is made up of gases and solid particles (particulate matter). Particulate matter can be from natural and man-made sources. The smaller the particulates, the more damage they can cause to the human body due to their ability to pass through membrane when inhaled and be transported around the body to lodge deep within different organs (9).

Why is it important to South Gloucestershire?

Clean air is vital to health and wellbeing. Air pollution can harm every organ in the body from our very first breath and shortens our lives overall. It's the largest environmental risk we currently face.

5.9% of all deaths in South Gloucestershire can be attributed to particulate air pollution in 2020 and the wider impact on health and healthcare services is poorly understood (10).

The United Nations' Sustainable Development Goals (UN SDGs), set specific targets for substantially reducing the number of deaths and illnesses from hazardous chemicals as well as air, water, and soil pollution and contamination by 2030.

Local air quality is affected particularly by road traffic and this is something which is being targeted through the proposed Clean Air Strategy and Action Plan through

a number of measures. These documents are the result of collaboration across a number of key Council work areas, including climate change, public health, environmental health, strategic planning, transport, and street care to develop actions which will deliver widespread improvements and associated benefits in addition to air quality improvements.

If we look at emergency admissions for Chronic Obstructive Pulmonary Disease (COPD), years of life lost to circulatory disease, and emergency admissions for heart disease we can see that whilst there are many causes for these conditions, some Council wards are disproportionately affected.

Sources of air pollution

Sources of air pollution include Ammonia (NH₃) predominantly from farming practices, Nitrogen Oxides (NO_x) predominantly from road transport, Sulphur Dioxides (SO₂) predominantly from energy generation, Non-methane Volatile Organic Compounds (NMVOCs) predominantly from industrial processes as well as from particulate matter – solid particles or liquid vapours.

Particulate matter varies in size, with smaller particles being more harmful to health. Thirty-three percent of particulate matter comes from non-UK sources, but local factors are still important in improving air quality.

Particulate emissions in the UK come from (6):

- 38% from burning wood and coal in domestic open fires and solid fuel stoves
- 12% from road transport
- 13% from solvent use and industrial processes

- 16% from industrial combustion (non-domestic burning)

Wood Burning

Wood burning, though a renewable source of energy, is bad for air quality and can release harmful pollutants directly into the home (6). Using dry 'ready to burn' wood, and wood burners and stoves that have passed DEFRA testing for emission levels can help to mitigate the impact. As the cost of fuel rises, advice around the use of solid fuel burning for cooking and heating may be more necessary as people look for cheaper ways to meet their energy needs.

Transport

Use of cars for transport releases several different pollutants into the air. Along with switching away from diesel, not idling engines when stopped, and choosing active travel or public transport where possible can help to improve air quality.

Active travel is not only good for air quality but cycling or walking for those short journeys is good for physical fitness

and wellbeing too. One in four journeys are under a mile or a 15-minute walk, and if planned into the day can help integrate regular physical activity as well as reducing road transport emissions (11).

What are we doing?

Clean air and climate change can have differing short-term goals but the long-term impact on the planet and on human health is the same. Burning wood as a renewable fuel source is better for climate change than burning fossil fuels but the particulate matter created from burning wood contributes to trapping heat in our atmosphere.

As a local authority with powers relating to transport, planning and waste we can influence some of these sources of air pollution and we can work with local businesses, residents, and the farming community to reduce wider sources of air pollution.

As well as monitoring the quality of the air and putting in place measures to reduce impacts in air quality hot spots, as a local

authority we have developed an air quality action plan to improve air quality across the district. In recognising the links between sources of climate change and local impacts from a changing climate we have developed our Climate Emergency Strategy and yearly action plans to complement each other. Locally, we have set up a Clean Air and Climate Change Board to monitor progress.

Air quality and climate change have been promoted to standing agenda items at our health protection partnership meetings to urgently discuss our local actions and develop assurance on these critical topics. We are continuing to strengthen the relationship between environmental health and public health to address issues of air quality, increasing our capacity and reach as a local stakeholder.

What more can we do?

On an individual level we can all help to improve air quality by making small changes such as making sure that we take steps to mitigate or eliminate noxious emissions.

Having windows open when carrying out activities which create particulate matter at home such as cleaning, DIY or cooking can help reduce the health impact within our own home. Open fires in gardens are another source of domestic particulate matter which we can avoid.

Other simple measures such as turning off the car engine rather than leaving it to idle when stopped and choosing active travel or public transport rather than using the car can all contribute to improving air quality as can switching to electric or lower emission vehicles.

A longer list of measures we can take at home individually is available on the Council's [clean air pages](#).

It is important to note that some of the measures we can take can be cost intensive initially, and as we consider the current cost-of-living crisis; people may struggle to access these or may turn to lower cost options such as using open fires and stoves to heat their homes or to cook food. Domestic burning for heating and cooking comes with risks of pollutants in the home, however if there are no other less potential harmful choices, then using approved wood supplies and stoves can help to lower risk.

We must also acknowledge that there are barriers to people choosing lower emission modes of transport including cost or safety concerns and infrastructure needs to help make the lower emission and healthy choices the default choice because they are accessible and easier.

It is important to keep inequality in mind when talking about clean air. Our



communities where there are increased levels of deprivation are more likely to be disproportionately affected by poor air quality, and less able to make the changes necessary to mitigate it as easily due to factors such as cost. People are often time poor and will choose the options that work best with their lifestyle needs. If public transport or our cycling

infrastructure isn't safe or convenient to use people will find it harder to access these.

We can also continue to work closely with the community and key stakeholders to ensure that the built environment and green infrastructure promotes access to green space and active travel is safe and convenient.

Climate Change

Climate change is the greatest threat to global health in the 21st century. The evidence is overwhelming: climate change endangers human health. Solutions exist and we need to act decisively to change this trajectory." Dr Margaret Chan, former WHO Director-General (2007-2017)

What do we mean by Climate change?

Excess carbon and other 'greenhouse gases' (water vapour, carbon dioxide, methane, nitrous oxide, and ozone) from the burning of fossil fuels and agricultural practices traps heat in our atmosphere. The temperature of the planet is now 1.2°C above pre-industrial levels. This increase is leading to increasingly unpredictable weather patterns including more frequent extreme weather events such as flooding and heatwaves, in the UK and around the globe.

The warmest seven years have been since 2015 (top three being 2016, 2019 and 2020) (12) (13). This year's heatwave broke previously set temperature records for the UK causing national red weather warnings to be issued (1).

The Paris Agreement commits us to reducing greenhouse gas emissions to keep a temperature rise under 2°C and work towards keeping it below 1.5°C overall (4). A temperature hike of 1.5°C above pre-industrial levels would still lead to irreversible changes to our lives (2).

However, the Climate Change Risk Assessment (CCRA3), the government's most recent assessment identifies the current lack of preparedness for a 2°C or 4°C temperature rise (2).

Why is it important to South Gloucestershire?

Although climate change is happening on a global scale, its impacts are felt locally. Changes in the climate from rising

temperatures are both gradual and sudden. We see slow changes like increases in average temperatures and rising sea levels to sudden changes like more frequent extreme weather events.

This brings with it a variety of potential impacts. The key risks from climate change in South Gloucestershire are:

Flooding

As sea levels rise effecting coastal communities, and extreme weather events cause unprecedented levels of rain fall in short periods of time, flooding is expected to become more frequent.

As well as the direct health impacts of flooding (drowning, injuries, carbon monoxide poisoning) there are also indirect health impacts (depression, anxiety, post-traumatic stress disorder). The risk of mental health issues in people whose homes have been flooded is about

6 times higher than in those who are unaffected by flooding (14).

Mitigating the impact of flooding is difficult as not everyone can be relocated from flood prone areas easily and this has an impact on large communities. However, the government's risk assessment suggests relocation will be necessary with a 2-4°C rise as rising sea levels will make parts of our current coastline uninhabitable.

In the short term we can ensure that:

- robust flood mitigation measures are in place,
- people are aware of flood risks,
- community services are on hand to support in the event of a flood,
- and new building developments are planned with flood prevention in mind.

To prepare for sea level rise we are implementing the [Avonmouth and Severnside Enterprise Area – Ecology Mitigation and Flood Defence Project](#) and have a [Local Flood Risk Management Strategy](#).

Overheating

As temperatures rise globally, and extreme weather events such as heatwaves become more frequent, we see repeated instances of record-breaking high temperatures.

Temperatures higher than 25°C are associated with excess summer deaths, particularly in those who may struggle to control their own body temperatures or cannot alter their environment such as the elderly, young children, the chronically ill and those with mental health problems or addictions, and those living in poor quality housing.

High temperatures are also linked to poor air quality with high levels of ozone which are formed more rapidly in strong sunlight; fine particles also increase in concentration during hot, still air conditions. Both are associated with respiratory and cardiovascular mortality, which is the main cause of death during heatwaves (15).

However, year-round warmer weather may also result in comparably fewer excess winter deaths, heatwave related excess deaths are expected to be lower than excess winter deaths overall.

Additionally, when combined with lower rainfall, warmer weather may also encourage people to participate in active travel and outdoor leisure activities, although extreme heat may have the reverse effect as people stay indoors to escape the high temperatures.

We are currently exploring how to mitigate the impact of heatwaves which may include setting up community cooling centres to support those who don't have access to a safe place to keep cool, making sure the most vulnerable are aware of how to keep cool and what support might be available, and building in heatwaves as a consideration in building planning and infrastructure – changes such as the orientation of buildings in relation to the sun, control over temperature control mechanisms, and green infrastructure

such as street trees can help bring down ambient temperature.

Locally we publicise the national heat wave alerts.

Public Water Supply

Water supply deficits from rising temperatures and population growth can lead to dehydration, increased disease transmission from reduced handwashing, and an increase in water borne diseases.

Heavy rainfall after periods of dry weather can also result in our sewage infrastructure being overwhelmed and untreated sewage being released into our waterways, also increasing the risk of disease transmission.

Locally water companies Bristol and Severn Trent manage public water supplies and wastewater processing.

Natural Capital

Our natural capital, the natural resources available to us, supports our access to the things we need to live, thrive, and enjoy

life. When this resource is depleted, it can have a wide range of health impacts from poor mental health and well-being, to reduced fitness with fewer opportunities for recreation, poor air quality impacting on respiratory and cardiovascular health, and increased localised temperature leading to excess summer deaths through overheating.

Locally we have a [Green Infrastructure and Nature Recovery Action Plan](#) and have committed to double tree canopy cover by 2030 which helps to reduce the ambient temperature on our streets.

Food production

Extreme weather events will affect how well crops grow not just in the UK but around the world. The resilience of the UK food system in the long-term depends on our stewardship of our natural resources here and overseas, and how international markets respond to pressures from climate breakdown.

It is likely that fresh produce will increase in price and reduce in availability, we have already seen this in relation to specific crops grown abroad this year. Overall, the availability and affordability of food will have impacts on the diet of the population and on the nutritional content of food leading to a risk of dietary deficiencies.

Encouraging people to use space in gardens and reuse community green spaces such as green verges to plant food can help people reconnect with nature, with food, and improve stewardship bringing more productive green spaces to urban areas and building stronger community networks (16) (17).

Locally we have been planting new orchards.

Pests and Diseases

As the climate in the UK changes to be warmer and wetter in the winter and hotter and drier in the summer, the changes will allow some pests and diseases to extend their range.

Though not necessarily caused by climate change, several vector-borne diseases (i.e., diseases spread by insects and ticks) have expanded in Europe in recent years, including vivax malaria, Lyme disease (already present in the UK) and tick-borne encephalitis.

Additionally, periods of hot, dry weather followed by heavy rainfall can exceed the capacity of our drains, leading to raw sewage being released into our public watercourses, increasing the risk of disease transmission for those swimming coming into contact with sewage contaminated water.

Locally we work with national and regional partners to monitor trends in pests and diseases and to take action accordingly.

What are we doing?

Monitoring progress to Net Zero

The Climate Change Act 2008 sets a legally binding target to reduce UK greenhouse gas (GHG) emissions by 80% by 2050 on

1990 levels in order to help limit dangerous climate change (18).

In 2019 South Gloucestershire declared a climate and nature emergency pledging to provide the leadership to enable South Gloucestershire to become carbon neutral by 2030. South Gloucestershire monitors progress with a [net zero dashboard](#).

Embedding Climate Change in Decision Making

The Cornwall decision making model is being piloted within the Council to bring consideration of climate impact into focus when commissioning goods and services. The focus on climate breakdown during decision making can help prioritise and embed climate breakdown as a key component of the decisions made and accelerate progress on emissions reductions and local resilience.

Green Social Prescribing

Bristol, North Somerset, and South Gloucestershire Integrated Care Board (BNSSG ICB) are a 'test and learn' site for

green social prescribing, helping people reconnect with nature for their mental and physical health (19) (20).

The benefits of accessing green spaces for health are well documented for adults, and a recent study showed that walking or being in nature demonstrated immediate improvements in mood and anxiety in 14- to 24-year-olds living in urban environments (21).



What more can we do?

Thinking about the way we live, work, and use our environments is key to both improving our impact of the climate and in putting in place adaptations to meet the needs of the future.

Planning for climate breakdown both in terms of new developments but also consideration of our existing built environments and housing stock to understand the measures needed to make them resilient is a significant challenge.

Our communities where there are higher levels of deprivation may struggle to make the adaptations needed to change to more efficient fuel sources for heating or the adaptations needed for cooling their homes. The quality of the housing stock may also increase the financial burden of adaptations (22).

Infrastructure measures, particularly green infrastructure such as street trees can help reduce ambient temperatures

and should be considered alongside retrofitting adaptations.

Public service infrastructure needs to be in line with the expected increased flooding risks and the location of current and new housing stock should be considered with flooding and heatwaves in mind.

Local food production and distribution and water conservation are also key to preventing health impacts and provide opportunities to reconnect with nature.

This can be ensured through careful consideration of the climate in local policies including planning, housing, transport, green infrastructure, food, agriculture, the economy, and public health.

Stewardship of our climate and green spaces should be owned collectively by our communities. Access to greenspace is linked to wellbeing, and beyond improving the climate has positive benefits for mental and physical health (23).

Prioritising clean air and the climate

South Gloucestershire declared a Climate and Nature Emergency in 2019 and a Clean Air Strategy and Action Plan is in development. Protecting the health of our communities through prioritising clean air and climate breakdown requires a radical rethinking of the way we all work and live. We can all make changes on an individual level but collectively we can transform our local community by reducing pollutants, protecting and restoring our natural capital, and making our area more resilient to climate breakdown.

Making Decisions

As a Council and as a community, the decisions we make can have a significant impact on both air quality and climate breakdown. Individually, prioritising reducing our emissions might look like choosing to walk a short journey instead of driving, at a Council level this would mean embedding clean air and climate breakdown into the decision-making

process and might look like organising our communities to be walkable and our homes to be resilient.

Adaptation and resilience

We need to make sure our built environment and housing stock is liveable now, and into the future. Newly built housing stock will only be one fifth of all housing stock in 2050 (22), meaning we will need to retrofit existing houses with adaptations to withstand extreme weather events, as well as making sure new developments are built with resilience to climate breakdown in mind.

Lower emissions by default

Climate and clean air friendly options are most often the healthier option too. Our built environment can change the way we live, work, and relax. The pedestrianisation of urban centres, and the development of cycle lanes, walking bus routes and clean air zones around

schools all help make low emission options the default.

Reconnect with nature

Accessing the natural resources available to us can boost wellbeing, providing opportunities to take notice, be active, connect, give, and keep learning. Re-greening urban landscapes by planting more street trees, meadowing grass verges (24), and community food growing (17) can all help residents reconnect with nature whilst tackling some of the causes of poor air quality and climate breakdown.

Raise the profile

We know the impacts of poor air quality and climate breakdown are likely to be disproportionately felt by the most vulnerable in our society. Through this report and the discussions that come after creates the opportunity to raise awareness and prioritise clean air and climate change.

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