



# Healthier Together Estates Climate Change Adaptation Plan 2021-2025



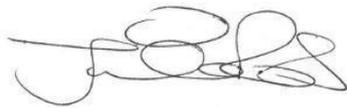
## Foreword

Climate change adaptation in the NHS is about organisational resilience and the prevention of avoidable illness. It's about embracing every opportunity to create a sustainable, healthy and resilient healthcare service fit for the future. It's about reducing our impact on the environment to prevent climate change, reducing our organisational running costs, ensuring business continuity and reducing health inequalities, but most of all it's about making sure that the NHS, our buildings, our services, our staff and our patients are prepared and ready for what lies ahead.

The prevention of avoidable illness, promotion of health and wellbeing and organisational resilience are fundamental to the future of the NHS. The *NHS Long Term Plan (2019)* reinforces the requirement to embed resilience and sustainability into our healthcare services. Climate change adaptation is critical to achieving this. The impacts of climate change on our health, services, infrastructure and our ability to cope with extreme weather events will place significant additional demands on us in the future.

This adaptation plan identifies the shared risks we face as a healthcare system across the Bristol, North Somerset and South Gloucestershire region and emphasises the importance of working in partnership across our region to ensure our Estate Strategies are robust and enable system wide resilience.

By ensuring our region is resilient to the effects of climate change, we will achieve cost and carbon savings and contribute to the prevention of avoidable illness to achieve a healthier future together.

A black ink signature of Julia Ross.

**Julia Ross**

A blue ink signature of Robert Woolley.

**Robert Woolley**

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# 1. The 2050 vision for sustainable healthcare

- Integration across the wider health and care system is fundamental to the delivery of sustainable healthcare
- Excellence in the efficient use of resources, energy, water and waste management.
- Sustainable commissioning and procurement processes ensure resilience across the health and care supply chain.
- Sustainable building design and construction ensures all buildings are built to the highest specification.
- Advanced energy systems generate and deliver 100% renewable energy, utilising energy recovery and conversion of low and high grade waste heat where possible.
- Technology is driving increased resource efficiency and reduced consumption patterns for energy, water, waste and recycling.
- Zero emission vehicles for regional health and care system use.
- Health and care workers commute by public transport, walk or cycle to work.
- Information and communication technology has radicalised the delivery of healthcare, adopting high tech remote access to services and locally based diagnostic facilities.
- Where possible, service user meals are made freshly onsite by providers using locally grown, seasonal ingredients.
- Clinicians strive for sustainable models of care through health promotional interventions as curative treatments where possible.
- Prevention and cost efficiency means that, despite falling budgets, healthcare remains free at the point of delivery.
- The NHS, its supply chain, contractors, staff, patients and our local community are healthy, resilient and fully prepared for the impacts of climate change.



## 2. Introduction

Climate change has serious implications for our health, wellbeing, livelihoods, and the structure of organised society. Its direct effects result from rising temperatures and changes in the frequency and strength of storms, floods, droughts, and heatwaves—with physical and mental health consequences (*The Lancet, 2017*)

Across the region, Bristol, North Somerset and South Gloucestershire Councils have been working proactively developing strategies in recent years to prepare for and adapt to climate change.

This Climate Change Adaptation Plan has been prepared specifically for the NHS in the Bristol, North Somerset and South Gloucestershire (BNSSG) region by the BNSSG Health and Sustainability Group (BHSG), a partnership group of NHS professionals working to embed sustainable development within the local health service.

The plan sets out the climate change risks facing NHS health and social care providers, commissioners and support services within the BNSSG area and looks at how these risks can be mitigated moving forward in a changing climate.

The plan includes climate change risk assessment and action plan templates for each NHS organisation in the BNSSG region.

Going forward the NHS Trusts and Local Authorities will be working in partnership across the Bristol, North Somerset and South Gloucestershire system under the Healthier Together banner to address high priority climate change risks and adaptation opportunities within the Sustainability Transformation Partnership (STP).

It is essential the themes identified within this plan are embedded across the STP through the following areas;

- Prevention, early intervention and self-care
- Integrated community and primary care
- Acute care collaboration

The plan has been prepared on behalf of the BNSSG STP Estates Group



Image 1: The importance of climate change on the STP

## 2.1 Legislation and drivers for climate change adaptation

The prevention of avoidable illness, promotion of health, wellbeing and organisational resilience are all fundamental to the future of the NHS.

The *NHS Long Term Plan (2019-2029)* recognises these vital requirements to achieve a sustainable health service. The plan commits to improving air quality, adhere to best practice efficiency standards and the adoption of new innovations to reduce waste, water and carbon. The plan highlights the importance of prevention and promoting resilience to achieve strong local communities and economies.

The plan sets out the government's carbon target which has since been updated to meet 100% net zero carbon by 2050.

The plan builds on the commitments outlined within the *NHS Sustainability Strategy, Sustainable, Resilient, Healthy People and Places (2014-2020)* and the *NHS Sustainability and Transformation Plans* which reinforce the requirement to embed resilience and sustainability into our healthcare services.

The Strategy further enhances the work already achieved by Local Authorities and Public Health which have led the way in

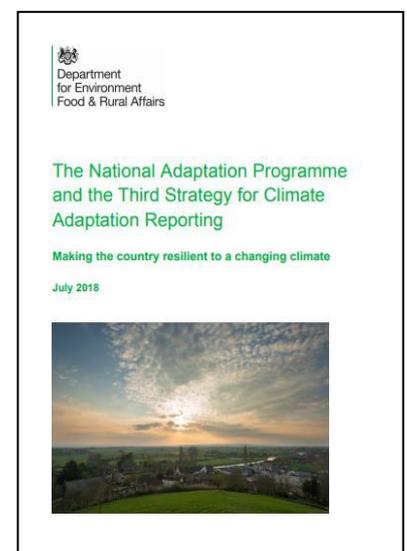
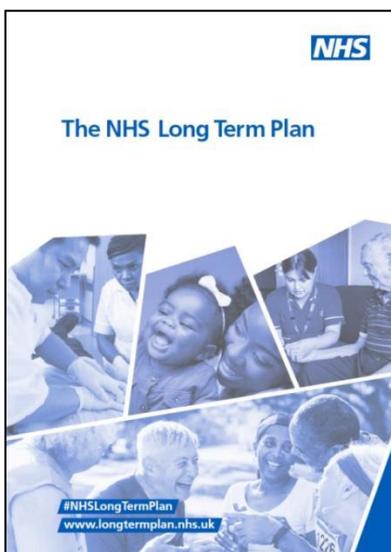
embedding sustainable development across their services. Climate change adaptation is critical to achieving this. The impacts of climate change on our health, services, infrastructure and our ability to cope with extreme weather events will place significant additional demands on the NHS in the future.

During 2019, Bristol City Council, North Somerset Council, South Gloucestershire Council, University Hospitals Bristol NHS Foundation Trust and North Bristol NHS Trust all declared Climate Emergencies and signed up to the ambitious local goal to achieve zero carbon by 2030.

In early 2020 Bristol City Council launched the One City Climate Strategy which includes an objective that public sector organisations in the city: *“improve resilience to climate hazards through collaborative organisational strategy, planning and operation.”*

The following additional drivers are relevant to the resilience of the regional BNSSG healthcare estates.

- The *Civil Contingencies Act 2004* requires NHS organisations, their subcontractors and providers of NHS-funded care to show that they can deal with incidents and emergencies such as extreme weather situations while maintaining services to patients.



- The *Health and Social Care Act 2012* strengthens arrangements for emergency response. It sets specific emergency duties for the Secretary of State for Health, NHS England and clinical commissioning groups.
- *The National Adaptation Programme (2018)* requires all NHS Trusts to have an adaptation plan in place, either stand alone, or as part of their Sustainable Development Management Plan.
- *The UK climate change risk assessment (CCRA) (HM Government, 2017)* states that building resilience is an ongoing investment and that a start needs to be made now, particularly for those risks where decisions have long-term consequences.
- The *NHS Standard Contract* requires all NHS organisations to demonstrate progress on climate change adaptation and mitigation.

To assist in assuring compliance with the legislative drivers, this Adaptation Plan is further driven by contractual and policy requirements:

- *Department of Health; Health Technical Memorandum 07-07 Sustainable health and social care buildings* sets out requirements on estate development. This document reinforces how local NHS organisations can support and embed legislation through HTM guidance.
- *Planning for a resilient healthcare estate, 2014* sets out best practice guidance on the design and planning of new healthcare buildings and on the adaptation and extension of existing sites.
- *NHS Improvement* is leading on a national campaign to ensure the NHS and the health and care system is preparing for climate change adaptation.
- The *Sustainable Development Assessment Tool (SDAT)* is a national benchmarking process monitoring health and social care provider's progress on climate change adaptation and mitigation. The SDAT measures progress against the World Health Organisations Sustainable Development Goals (below) and benchmarks progress nationally against NHS organisation.



Image 2: World Health Organisation Sustainable Development Goals relating to climate change adaptation

### 3. What is Climate Change?



The UK MET Office describes climate change as a large-scale, long-term shift in the planet's weather patterns or average temperatures.

There is overwhelming scientific evidence that the warming effect is due to increases in levels of greenhouse gases (carbon dioxide, methane, nitrous oxide, chlorofluorocarbons and ozone) released as a result of human activity.

The impacts of a changing climate may feel like a global issue and not likely to affect us, however climate change is happening in the UK and is likely to affect our local environment in ways we might not expect.

The physical impact of climate change on our natural environment is forecast to include extreme heat and cold, increased ground level ozone, more flooding and storms, increased freshwater pathogens, and increased sunlight (ultra violet (UV) light levels), all of which will impact the NHS in one way or another.

*“Changing weather patterns, more frequent extreme weather and rising temperatures have direct implications on our health, and also pose challenges to the way in which the NHS operates”.*

*Professor David Walker, Deputy Chief Medical Officer, Department of Health.*

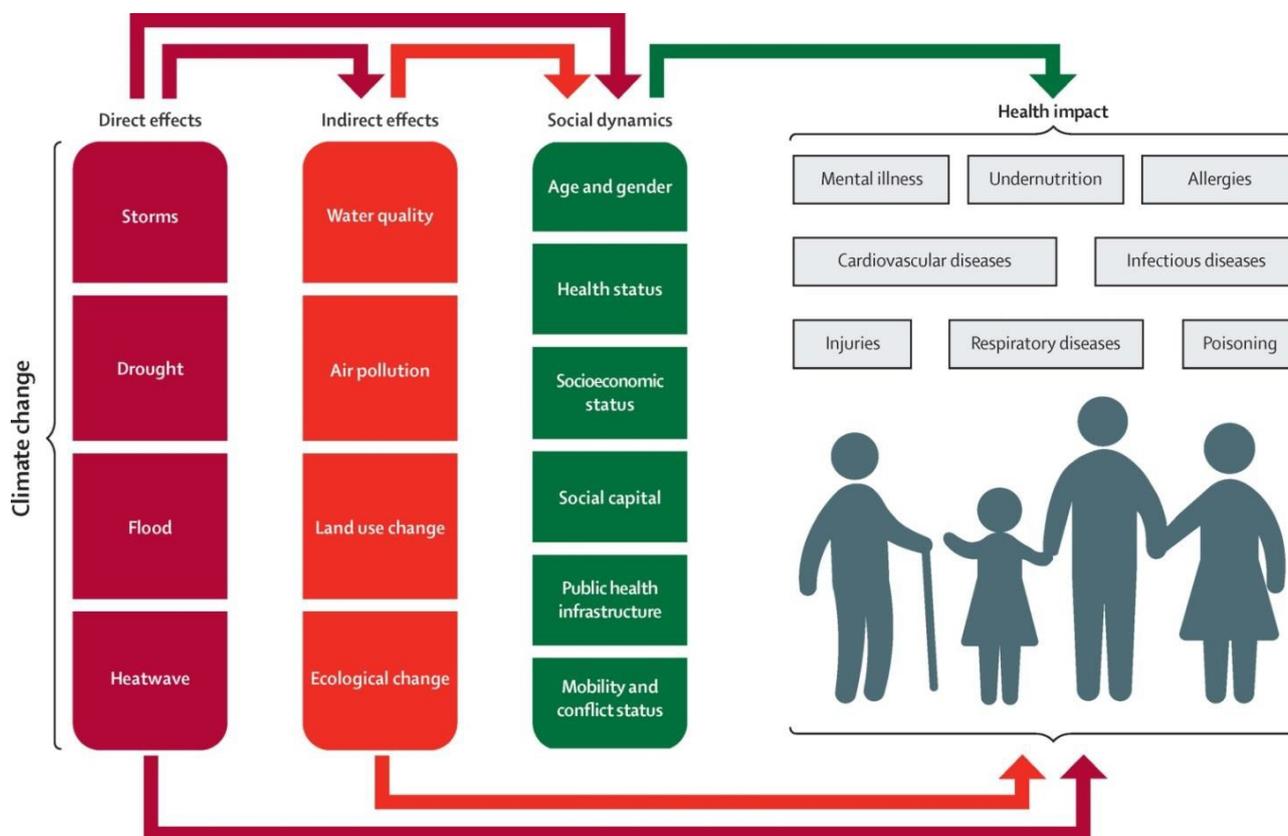


Image 3: Health and climate change: policy responses to protect public health. The direct and indirect effects of climate change on health and wellbeing. The Lancet. June 2015.

Rising temperatures associated with a changing climate are already impacting the UK. Recent evidence suggests that the average UK land temperature was 0.9°C higher during the period 2005-2014 compared to 1961-1990, with 2014 being the warmest individual year on record (UK Synthesis Report 2014). The report also states the average number of hot days per year has been increasing since the 1960s.

The 2020 Bristol One City Climate Strategy considered a range of emissions scenarios and climate hazards for the city. For the high emissions scenario the summer maximum temperature was predicted to increase by over 9°C by 2080.

The combined threat of rising temperatures and an ageing demographic amounts to an increased risk of overheating, particularly during extreme heat events.

### 3.1 Cold

Extreme cold weather events are likely to be less severe as the changing climate takes effect, with cold spells occurring less frequently, and lasting for a shorter period of time than was historically the case.

However cold conditions will still occur due to the natural variability in the weather from year to year and extreme cold will remain an important climate risk going forward due to an ageing population increasing the number of vulnerable patients.

The current figures report between 35,800 and 49,700 cold-related deaths per year on average in the UK (*UK Climate Change Risk Assessment Synthesis Report, 2017*).



Image 4: Snow in Bristol

### 3.2 Aeroallergens

Aeroallergens are any airborne substance, such as pollen or spores which can trigger an allergic reaction. Aeroallergens associated with pollen grains and fungal spores will be affected by climate change.

The predicted changes in seasonality, temperature and weather patterns in the UK related to climate change is thought will have an effect on human exposure to pollen grains, as well as affecting the potency of aeroallergens (Public Health England 2012)

Existing allergy sufferers may suffer from longer pollen seasons and more rapid symptom development as a result, with the season as we know it starting earlier and finishing later.

Public Health England also reports there will likely be a longer term indirect effect on the UK population through changes in plant and fungal distributions.

### 3.3 Ground Level Ozone

Ground level ozone is a respiratory irritant strongly affected by climate and background levels of ozone have been found to be increasing across much of Europe (Public Health England, 2012).

Ground-level ozone is a colour-less gas which forms just above the earth's surface and is a secondary pollutant created when two primary pollutants react in sunlight and stagnant air.

Ground level ozone has significant impacts on human morbidity and mortality, mostly related to effects on the respiratory system.



### 3.4 Flooding and Storms

The UK Adaptation Sub Committee (2014) reports that increased flood risk is the greatest threat to the UK from climate change, with historical emissions and global warming likely to have already increased the potential for flooding in England.

During 2014, the UK suffered wide scale flooding with unprecedented levels of rainfall in southern England. Some parts of the country experienced rainfall three times the historic average in January 2014 with an estimated 7,000 properties flooded across the winter period.

At a local level, large areas of the Somerset Levels were inundated by flood water for an extended period in 2014. As a result, a “major incident” was declared in late January by Somerset County Council and Sedgemoor District Council, where

5,000 military personnel were called in to provide support to the emergency services.

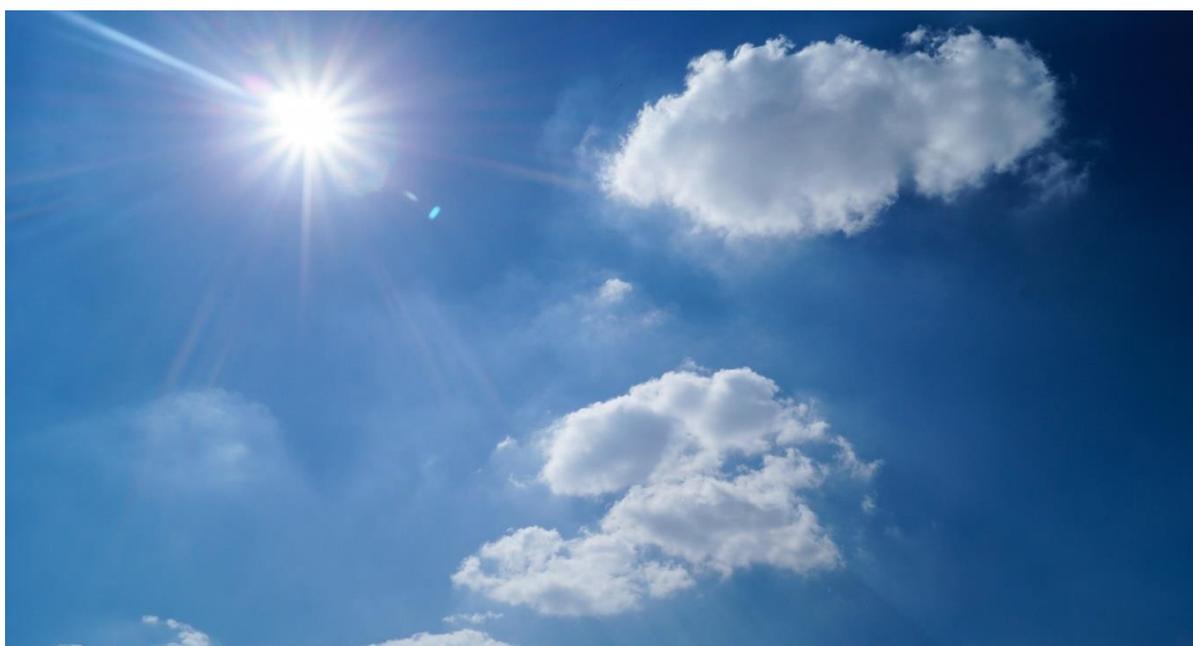


Image 5: Flooding in the UK, 2013. (The Independent)

The Bristol One City Climate Strategy predicts Bristol’s winter rainfall to have increased by up to 48% by 2080, together with an increase of up to 72cm in the sea level on Bristol’s coastline. This increase in rainfall and sea level rise will have significant consequences for local coastal and river flooding.



Image 6: Land (in red) predicted to be below annual flood level in 2050, <http://sealevel.climatecentral.org/>



### **3.5 Vector, food and water borne diseases (bio-impacts)**

Vector-borne diseases are influenced in complex ways by the climate, land use changes and human activities, and as such it is difficult to make quantitative predictions of future changes due to climate change.

However, the warmer wetter conditions predicted as a result of climate change are likely to bring new and emerging pests and diseases to the UK.

The likelihood of range and activity of some tick and mosquito species will increase across the UK by the 2080s, with the potential for the introduction of other exotic species and pathogens (Public Health England, 2012).

Climate change can also influence the incidence of certain water and food-borne diseases, which show seasonal variation e.g. salmonella. Increased temperatures will allow pathogens such as Salmonella to grow more readily in food.

### **3.6 Ultraviolet Radiation (Sunlight)**

Current climate change predictions for the UK indicate an increase in net surface UV radiation by the end of the century for southern England (up to 10% by the 2080s for the high emissions scenario), reducing further north.

However, future exposure will depend on solar radiation levels as well as time spent outdoors and the degree to which people protect their skin.

The South West has the highest levels of UV radiation in the UK and is also where the highest percentage of the population visit the outdoors for recreation on a weekly basis, and as such the population also have a higher incidence of skin cancer relative to the national average (Adaptation Sub Committee 2014).

## 4. The Impacts of climate change on our health and care system



Image 7: Lion in the Snow at North Bristol NHS Trust, 2018.

The impacts of climate change on our health and how these impacts affect the delivery of our healthcare services are significant.

#### 4.1 Clinical Impacts

This section of the plan outlines the known potential impacts on our healthcare services from a clinical perspective.

##### 4.1.1 Heat related illnesses and morbidity

The Adaptation Sub Committee (2014) reports that heat contributes to about 2,000 premature deaths per year in the UK. The effects of increased mean temperatures and population growth are projected to increase deaths in summer to approximately 7,000 per year in the 2050s across the UK.

In August 2003, more than 20,000 people died after a heatwave affected much of the UK and Europe. It is estimated the heatwave was the warmest on record for more than 500 years. In France, approximately 15,000 people died due to the extreme heat. The health service did not have the capacity to deal with this high incidence which subsequently resulted in a shortage of mortuary space.

More recently, the heatwave of 2018 saw a run of 15 consecutive days with temperatures above 28C. According to the Office of National Statistics (2018), registered deaths were 663 higher than the average for the same weeks over the previous five years.

The UK Synthesis Report (2014) predicts that heatwaves in the UK like that experienced in 2003 are expected to become the norm in summer by the 2040s.

Increasing temperatures can also exacerbate existing health problems in populations and introduce new health threats (including cardiovascular disease and chronic kidney disease). The health

impacts of extreme heat range from direct heat stress and heat stroke, to exacerbations of pre-existing heart failure, and even an increased incidence of acute kidney injury from dehydration in vulnerable populations. Elderly people, children younger than 12 months, and people with chronic cardiovascular and renal disease are particularly sensitive to these changes.

Without climate change adaptation, the number of additional deaths and illness associated with heat is likely to increase.

##### 4.1.2 Cold related illnesses and morbidity

The Adaptation Sub Committee reports that cold is the largest weather-related contribution to mortality in England. After accounting for differences in winter temperatures, cold-related mortality in the UK remains higher than for other north-western European countries such as France, Germany, the Netherlands and Finland.

The majority of deaths related to cold are from respiratory and cardiovascular causes, rather than hypothermia, with cold weather also increasing the number of slips, trips and falls and subsequent fractures. People over 75, children under 5, those with existing medical conditions and people living in deprived circumstances (in particular, those living in fuel poverty) are especially at risk.

Cold-related mortality is likely to decline slightly with rising mean temperatures, but is projected to remain the largest weather-related risk to health in the future. Due to an ageing population, approximately 40,000 excess deaths per year are still expected in the 2050s as a result of cold weather compared to 41,000 today.

#### 4.1.3 Increased respiratory disease

*The Adaptation Sub Committee (2014) reports* respiratory conditions (mainly chronic obstructive pulmonary disease and asthma) currently affects 12 – 16% of the population in England and cost the NHS around £2 billion a year.

The increase of aeroallergens and ground level ozone will likely increase the numbers of respiratory conditions seen across our healthcare services going forward, exacerbating the demand on the NHS.

The Committee reports that as temperatures increase the concentration of ground level ozone will also tend to increase.

Public Health England analysis suggests that a 5°C increase in ambient mean temperature across the year will result in up to 500 extra deaths attributable to ozone exposure.

Present day ozone-related mortality is estimated to be up to around 11,900 premature deaths per year and the assessment shows increases of up to between 14,000 and 15,000 for the 2030s depending on future ozone precursor emissions.

Increasing temperatures by 5°C is projected to lead to an increased ozone related health burden of 4% (around 500 premature deaths per year) compared with the baseline) with the south east of England seeing the largest increases (Public Health England, 2012).

#### 4.1.4 Death and mental health effects of storms and flooding

The current and projected number of deaths associated with flooding as a result of climate change is small, but the effects on mental health and well-being are thought to be significant (Adaptation Sub Committee, 2014).

The Adaptation Sub Committee goes on to report the mental health consequences of flooding were one of the largest impacts highlighted in the 2012 Climate Change Risk Assessment. Studies looking at the well-being effects from flooding to date have relied largely on trying to measure changes in anxiety and depression scores on general health questionnaires.

Studies conducted after the 2007 floods for example have found that those affected by flooding displayed a two to five fold increase in mental health symptoms.

#### 4.1.5 Increased exposure to vector, food and water borne diseases (bio-impacts).

There is uncertainty over which pathogens will pose the greatest risk to human health in the future with climate change. There are several pathogens where exposure in the UK could increase in the future. Changes to the climate are likely to change the suitability in England for some pathogens that cause diseases in humans. Other diseases could be imported to the UK.

#### 4.1.6 Skin cancers

Public Health England (2012) reports the projected increases in temperature in the UK due to climate change are likely to encourage changes in behaviour that lead to more time spent outdoors. It is recognised that this may bring direct benefits, such as physical exercise, mental health benefits and possibly increased vitamin D production.

The number of people dying from melanoma each year is similar to the total heat related impact on mortality, at around 2,500 annual deaths. However the risk of non-melanoma skin cancers (mainly related to cumulative UV exposure) and malignant melanoma due to sudden increases in exposure levels (and possibly sunburn) may see an increase in these figures.

Disease /Illness	Evidence of current/future range shifts
<b>Lyme Disease</b>	Likely to increase. Already present in UK. Primarily transmitted to human via <i>Ixodes ricinus</i> (sheep tick), which is spreading and increasing in Europe. Spread is linked to warmer temperatures at high altitudes.
<b>Dengue fever</b>	Some risk of introduction. Transmitted mainly by <i>Aedes</i> mosquitoes; not currently present in UK, but future climate may become suitable for <i>A. albopictus</i> and other species. Breeds in containers such as water butts, and would benefit from warmer summers. Cases of infection in France and Croatia reported in 2010.
<b>Chikungunya virus</b>	Risk of introduction. The most likely invasive species to establish in the UK would be <i>Aedes albopictus</i> , a competent vector for Chikungunya virus.
<b>Crimean-Congo Haemorrhagic Fever (CCHF)</b>	Some risk of introduction. <i>Hyalomma marginatum</i> is the most important vector for CCHF. Imported on migrating birds from Africa. Not currently established in UK as spring/summer mean temperatures are too low. Warmer temperatures may increase climatic suitability in the UK, leading to establishment of imported ticks.
<b>Infection with <i>Vibrio vulnificus</i></b>	Could increase. Suitability of coastal waters and in shellfish could increase with warmer sea temperatures and more coastal flooding. Can cause death if not treated immediately.
<b>Other food poisoning</b>	Could increase. Outbreaks linked to <i>Staphylococcus aureus</i> , <i>Bacillus cereus</i> and <i>Clostridium perfringens</i> are likely to increase with increased ambient temperatures, if food is stored incorrectly.
<b>Norovirus</b>	Could increase. Contamination of shellfish beds could increase in winter due to higher sewage contamination from higher river flows.
<b>Malaria</b>	Some risk of local transmission. Transmitted by <i>Anopheles</i> mosquitoes, six species currently resident in UK but do not carry the <i>Plasmodium</i> parasite. The climate is warm enough for transmission and warmer temperatures will increase chances of transmission.
<b>Tick-borne encephalitis</b>	Unlikely to be introduced. Common in central/eastern Europe, recently reported in Scandinavia for the first time. Modelling studies suggest that risk of increased transmission in UK is small.
<b>Legionella</b>	Heatwaves correspond to higher cases of the disease than periods of more stable weather

Table 1: Changing suitability of the UK climate for pests and pathogens

## 4.2 Non Clinical Impacts

The impacts of climate change will affect the non-clinical areas of our healthcare services such as estate infrastructure, supply chains and the accompanying support services which are vital in the delivery 24 hours a day.

These services are critical, but are even more essential during emergency situations such as extreme weather.

Climate related events such as severe storms and flooding might compromise electricity and water supplies, interrupt supply chains, disable transportation links, and disrupt communications and IT networks, all of which reduce the capacity to provide the healthcare services we need.

This section reviews these non-clinical impacts, with a particular emphasis on our local area.

#### 4.2.1 Estate Infrastructure

##### *i) Overheating*

Increasing summer temperatures will increase the risk of buildings overheating especially in UK cities, increasing the health risk associated with heat stress (Public Health England, 2012).

Climate projections for the UK indicate increases in mean outdoor temperatures by 2080, with the largest increases expected in the south, where population density is higher, and the smallest increases in the north.

Heatwaves will also increase the risk of buildings overheating, with daily mean temperatures being significantly higher indoors than outdoors in some naturally ventilated buildings.

ii) Local Flood Risk

The Adaptation Sub Committee (2014) reports across England and Wales, the number of hospitals, GP surgeries, emergency service stations or care homes located in areas of significant flood risk are projected to increase by the 2050s by between 3 and 24% under a 2°C scenario, and between 27 and 110% under a 4°C scenario (assuming a continuation of current levels of adaptation).

The impacts of flooding and coastal change in the UK are already significant and expected to increase as a result of climate change. The BNSSG region is located on the North Somerset coastline, therefore it is not surprising to learn that the region is at risk of flooding from a number of sources; the most significant being fluvial and tidal flooding.

Capita (2011) reports that the climate

change impacts will mean long term increases in average sea levels in the adjacent estuary, with sea levels predicted to gradually rise in years to come. Recent advice from Defra states that over 100 years the mean sea level in the estuary will increase by approximately 1m.

Assuming that no changes are made to the existing banks or walls that protect the land from flooding the long-term increase in sea levels means that the flooding in the future will be far worse than it could be today.

Additionally the average rise in sea levels will mean that there will be an increased chance of significant flood events occurring more frequently (Capita, 2011).

During 2019, South Gloucestershire Council, North Somerset Council and the Environment Agency commenced a joint capital project to improve sea defences running through Avonmouth and Severnside.

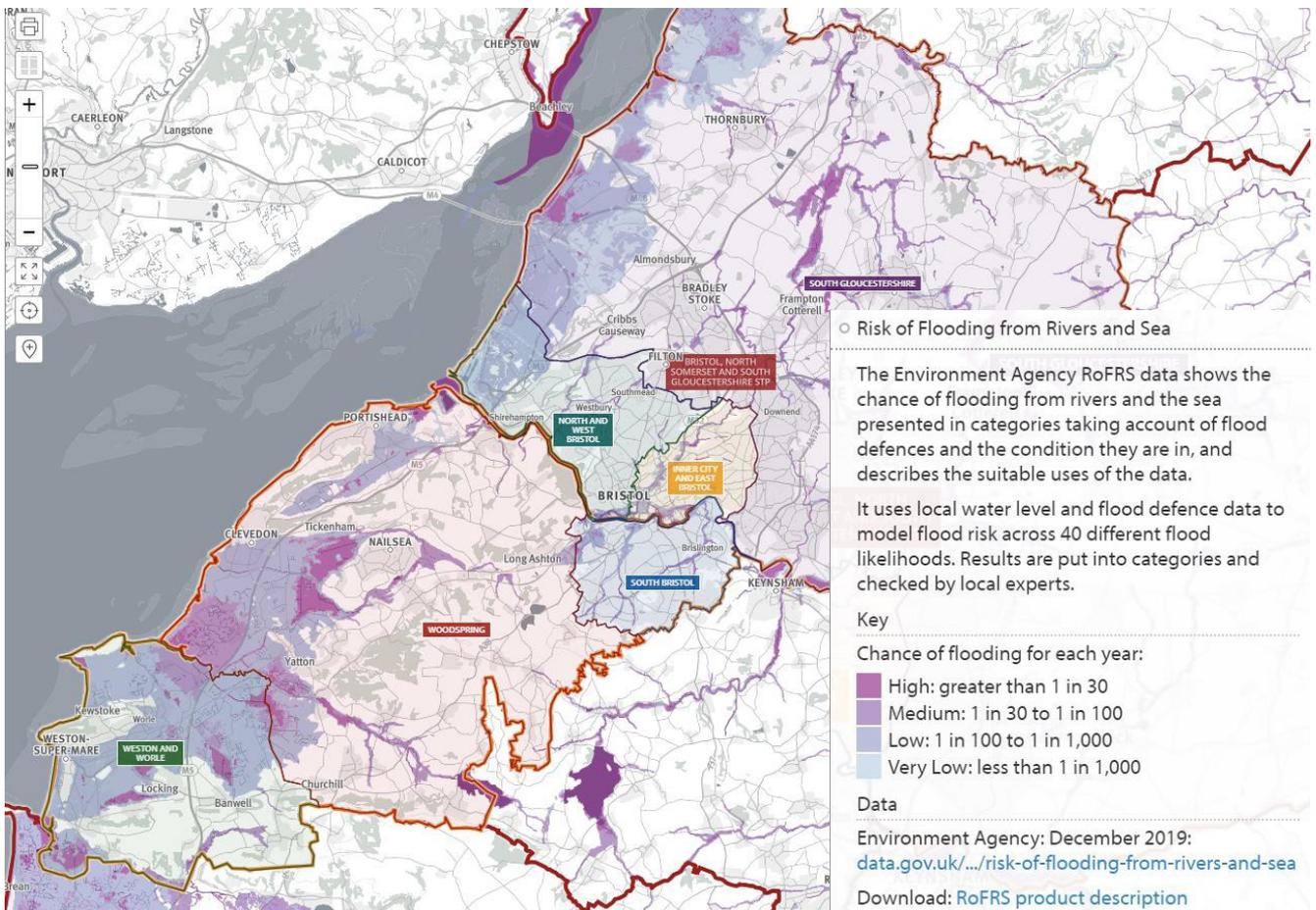


Image 8: SHAPE - Flood Risk in the BNSSG region

#### 4.2.2. NHS Supply Chain

The links between NHS services and how they rely on the natural environment are complex, ranging from the availability of natural resources such as water and fuels to generate energy, to the provision of services which rely on the environment such as food production and the availability of cotton and other natural resources which the NHS relies upon throughout the healthcare sector.

##### *i) Energy Supply*

The continuity of the energy supply is vital to the delivery of the ability of the NHS to provide healthcare services.

The majority of our local energy is supplied by the national energy infrastructure which is increasingly vulnerable to shocks, stresses and strains as it is imported from across the world.

During times of extreme weather such as the episode in March 2018, when the polar vortex met Storm Emma resulting in extensive heavy snow and a prolonged cold spell. As a result, the National Grid issued its first gas supply shortage warning in a decade.

However, the short term shock effects of extreme weather events on our energy supply network should not be considered alone. The long-term stressors /risks on other elements of our energy supply network should also be considered;

- Fossil fuels are finite and are becoming increasingly more difficult to produce. This will affect their availability in the coming decades.
- Risk of electricity shortages as coal fired power stations continue to close.
- World energy prices are predicted to rise over the coming decades. This will have a twofold effect on the NHS;
  - More vulnerable patients will not be able to afford to heat their homes, placing them into fuel poverty.
  - NHS organisations and acute healthcare providers will see a sharp increase in energy bills as a result.



## ii) Water Supply

Climate change is projected to reduce the amount of water in the environment that can be sustainably withdrawn whilst increasing the demand for irrigation during the driest months. At the same time the growing population will create additional demands on already stretched resources in some parts of the country.

The *UK Climate Change Risk Assessment 2017 Evidence Report* sets out how climate change combined with population growth may put greater pressure on water availability. By the 2050s, many catchments across the UK will need to manage water deficits and competing demands for water for public supply, industry, agriculture and the environment.

The continued availability of a clean and safe water supply is vital for healthcare premises, which are dependent on water to maintain hygiene, hydration and a comfortable environment for patients and staff (Department of Health, Health Building Note 00-07 – Planning for a resilient healthcare estate, 2014)

Increasing pressure on water resources is a growing risk. Buildings will need to become more water-efficient due to the predicted changes in water availability.

Short term shocks such as extreme weather can also lead to water supply issues such as the recent water supply shortage in February 2018 following the cold snap resulting in numerous burst water mains across the network.

Climate change and population growth may ultimately lead to less reliable supply conditions or restrictions on abstraction licences for those healthcare organisations with their own borehole supplies.

The local water company supplier Bristol Water, provides 1.1 million customers in the city of Bristol and surrounding areas which comes from a variety of sources including the River Severn, the Mendip Hills and wells and springs throughout the local supply area.

According the Bristol Water's Water Resources Management Plan 2014, the coming 30 years will bring social, economic and environmental challenges which could reduce the availability of water, while the demand for water increases due to a growing population.



Image 9: of Chew Valley Lake, Bristol

### iii) Food supply

The affordability of food for the UK population is subject to domestic and international risks affecting production and prices. Extreme weather events affecting international production, trade and supply chains could make food prices volatile with occasional spikes.

Longer-term incremental changes in climate are likely to alter the agricultural productivity of regions that are important for global food production. The resilience of the UK food system in the long-term will depend on the stewardship of natural resources here and overseas, and how international markets respond to the pressures from climate change.

The provision and availability of food is a necessity to the health and well-being of our patients, our staff and our local community.

The 'Who Feeds Bristol' report was commissioned by NHS Bristol and Bristol City Council to look at the resilience of Bristol's food network. The report identified that the UK imports 40% of its annual food requirements, with the percentage of imports varying greatly between food types, with 90% of fruit, and 60% of vegetables being imported.

Alongside fruit and vegetables we import poultry, beef, cereals and animal feed.

This figure may see a significant reduction following British Exit (Brexit) as the UK leaves the European Union as costs to import food may increase significantly.

Bristol and the surrounding area has a strong local food network. The Good Food Plan for Bristol (2014) outlines the opportunities for Bristol. With such a wealth of local farmers, producers, wholesalers, processors, caterers and shopkeepers who are on our doorstep, there is a significant opportunity to support the local economy, the environment and health and wellbeing by promoting and using locally grown produce within the NHS.

One such example is Bath and North East Somerset Council (BANES). The local authority has adopted a Dynamic Purchasing System to locally source food for their school meals contract. This could be replicated across our regional NHS health and care system to ensure all food supplied to patients is locally sourced where possible.



Image 10: Southmead Hospital Weekly Fruit and Veg Stall, courtesy of The Community Farm

iv) *Medical & Pharmaceutical Supplies*

The NHS is reliant on its supply chain to deliver goods and services when they are needed. However extreme weather and the impacts of climate change present a set of uncertainties that threaten the NHS supply chain and its ability to meet patient demand.

According to the Environment Agency Report, *Assessing and Managing Climate Change Risks in Supply Chains (2013)*, the costs of extreme weather to UK business are growing, with flooding in 2012 alone costing the economy over £12 billion.

Supply chains outside of the UK are also at risk. As supply chains regularly cross the globe, extreme weather and the impacts of changing climate abroad can be as relevant to suppliers (and customers) as flooding here in the UK.

This was clearly seen during the Thai floods in 2011, when suppliers and logistics were disrupted for thousands of companies (including pharmaceutical manufacturers).

Climate change risks include;

- Suppliers / producers located in a vulnerable geographical region (flood zones, etc.)
- Using raw materials in manufacturing which are sensitive to climatic conditions
- Heavily reliant on energy or water for production
- Transporting over long distances
- Supplier at risk of not recovering quickly from an extreme weather event

It is vital to ensure NHS contractors and suppliers are resilient to the impacts of climate change going forward to enable business continuity.



Image 11: Cotton Farmer, [www.theguardian.com](http://www.theguardian.com), 12/02/2014. (Accessed 25/07/2017)

#### 4.2.3 NHS Support Services

NHS support services are a vital part of our health and care services. Facilities management support services may be affected by the impacts of climate change in the following ways;

- Patient & Staff Travel
- Waste Services
- Linen & Laundry Services
- Catering Services
- Sterile Services
- Supplies/ Stores Management
- Other NHS Services (e.g. Pathology Services, NHS Blood and Transplant, Air Ambulance etc.)

##### *i) Patient & Staff Travel*

The region is well served by the local and regional transport network, with both the M4 and M5 motorways providing fast access by road in and around the BNSSG region. This local transport network provides the vital infrastructure link which enables the NHS to function in our region. Any disruption to the transport network as a result of extreme weather, fuel shortages, flooding will impact;

- Emergency Response vehicles (ambulances, helicopters, etc.)
- Non-Emergency Patient Transport

- Patient travel to sites
- Community staff
- Staff travel to sites
- Support services e.g. pathology services.

##### *ii) Waste Services*

Health and care services generate a significant volume of multiple waste streams (clinical, hazardous, pharmaceutical, domestic and recycling) which need removing from site on a daily basis. If for any reason waste contractors are unable to remove waste from site or unable to deliver clean clinical waste bins, this will result in an accumulation of waste on site and subsequent associated increased infection risks.

##### *iii) Linen and Laundry Services*

The provision of linen and laundry services, particularly for acute healthcare trusts with large numbers of patient beds will rely heavily on the provision of linen and laundry,

If during times of extreme weather (snow, flooding, etc.) suppliers of linen and laundry services are unable to collect dirty laundry or deliver clean linen our healthcare services will struggle to provide the required inpatient services.



Image 12: SWAST Ambulances at NBT

Drought may also impact on the ability of linen and laundry suppliers to meet demand.

#### *iv) Catering Services*

The provision of patient meals is a necessary service delivered by acute trusts for in-patients. Catering services provide essential energy and sustenance for patients spending any length of time in hospital and as a result rely on availability of food supply and the local transport network to enable delivery.

Extreme weather brought about by climate change, or other climate impacts such as drought may lead to shortages of supply and the inability of suppliers to deliver food to site.

#### *v) Sterile Services*

Sterile services are another fundamental support service enabling the smooth running of healthcare organisations.

An energy or drought situation or the failure of the transport network could significantly limit the capacity of sterile services to deliver clean medical equipment for clinical procedures.

#### *vi) Supplies / Stores Management*

As with other key support services, a failure in the local transport network would impact on critical deliveries of clinical and medical equipment and supplies.

#### *vii) Other NHS Services*

NHS support services such as the air ambulance, pathology and NHS blood and organ donation services are critical to the provision of clinical services across our region.

Extreme weather events have the ability to impact on these services, notably the air ambulance to operate in severe conditions. Likewise, there may be a higher demand for use of the air ambulance following extensive flooding to reach areas cut off by flood waters.

Severe weather can also impact the ability of members of the public to get to blood donation centres. Blood donation is proven to reduce during periods of bad weather, particularly long spells of snow.

Likewise, the ability of other support services such as NHS Blood and Transplant and NHS pathology services to be able to transport blood products and samples following the failure of critical infrastructure, will be impacted.



Image 13: NHS Blood and Transplant Flood, Filton, South Gloucestershire

## 5. Climate Adaptation and Resilience Solutions



Image 14: Southmead Hospital Green Roof, Brunel Building

The National Adaptation Programme (NAP) outlines that responsibility for addressing the impacts of climate change should be collaborative and led at both a regional and organisational level within the healthcare sector.

At organisation level, climate change adaptation should be driven forward through the development and implementation of Sustainable Development Management Plans (SDMP), Major Incident Planning, Business Continuity Planning and Severe Weather Plans.

The NAP encourages collaborative working through a multi system approach to find the regional solutions to the shared effects of climate change.

### 5.1 Clinical Solutions

Understanding the shared clinical risks of climate change and working collaboratively at a national and regional level to embed adaptation is fundamental.

Communicating effectively and planning our clinical services to ensure the healthcare system can respond to circumstances in a resilient way is vital.

One such example of this relates to poor air quality incidents. Poor air quality events will result in increased admissions to our acute care providers and lead to increased demand on our services system-wide. Effective communication on poor air quality days such as air quality alerts provided by the Met Office (below) enables vulnerable patients to protect themselves when poor air quality is forecast.



1 Image: Air Pollution Forecast

Local healthcare providers' working collaboratively to raise awareness of the links between poor air quality and health is another such example. The switch off when you drop off campaign, spear headed by the acute NHS trusts in Bristol encourages all vehicles in the vicinity of these acute hospitals to switch off their engines when onsite to protect their vulnerable patients and raise awareness about poor air quality and the impacts of health at the same time.

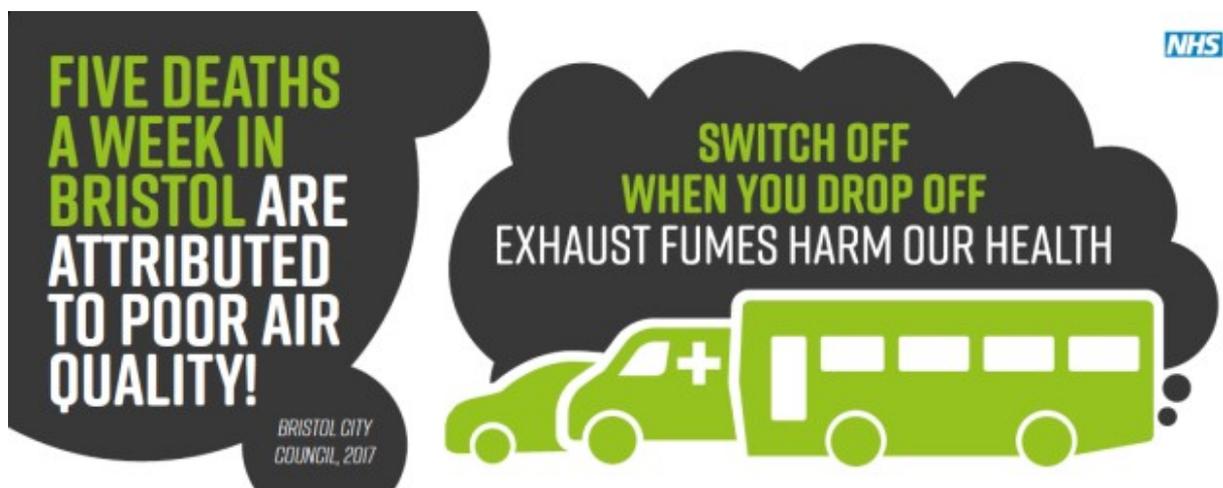


Image 15: Switch off when you drop off Campaign, 2017

### 5.1.1 Heatwave Plan

NHS England is leading the way with the provision of the national Heatwave Plan. The plan is triggered as soon as the Met Office forecasts that there is a 60 per cent chance of temperatures being high enough on at least two consecutive days to have significant effects on health. This will normally occur 2–3 days before the event is expected.

As death rates rise soon after temperatures increase, with many deaths occurring in the first two days, this is an important stage to ensure readiness and swift action to reduce harm from a potential heatwave.

Organisations should ensure heatwave plans are in place and actions taken as required. Key elements of the plan include;

- Strategic planning (infrastructure requirements e.g. cool rooms)
- Communication and engagement (raising awareness amongst staff and the local community)

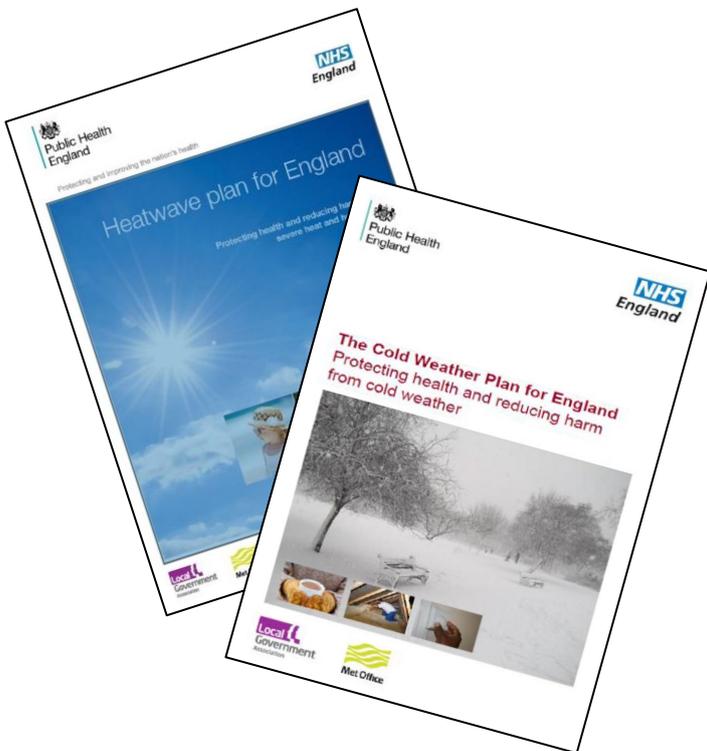


Image 16: NHS Hot and Cold Weather plans

### 5.1.2 Cold Weather Plan

NHS England has prepared a national cold weather plan. The plan documents what the NHS must do during spells of extreme cold weather.

The plan reports cold related deaths represent the biggest weather-related source of mortality. Although temperatures are gradually rising with climate change, cold weather deaths are still expected to be high by 2050, due to the ageing and increasing population.

Organisations should ensure the requirements laid out within the cold weather plan are adopted, implemented and communicated to staff and the local community.

The importance of collaboration across the healthcare system during times of extreme weather events is crucial to ensure resilience and the sharing of resources to enable the continuity of services system wide.



Image 17: NBT Snow Response, 2018

### 5.1.3 Identifying vulnerable populations and health inequalities

The *UK Climate Change Risk Assessment 2017 Evidence Report* stresses the climate risks will affect our local population differently, depending on their social, economic and cultural environment. Vulnerable groups have lower capacity and ability to adapt and respond to the impacts of climate change.

Those at greatest risk during heatwaves and other extreme weather events include;

- **Older people** (65 years +)
- **Chronic and severe illness** (heart conditions, diabetes, respiratory or renal insufficiency, Parkinson's disease or severe mental illness)
- **Infants**
- **Homeless people**
- **People with alcohol and drug dependence**
- **Low income households**

Low-income households are also particularly susceptible to climate change impacts, as these local impacts disproportionately affect their resources. Likewise, vulnerable patients unable to heat their homes sufficiently are more at risk of developing health conditions, thus increasing the demand on the NHS. By identifying these vulnerable patients, we can target our communications and better support them.

One such opportunity which could be further rolled out across the system is the Centre for Sustainable Energy (CSE) Warmer Homes Advice and Money (WHAM) service which helps healthcare settings meet the 2015 NICE guidance. *The Excess winter deaths and illness and the health risks associated with cold homes* guidance recommends making sure vulnerable people are not discharged

from health or social care settings to a cold home as returning to a cold home after a spell in hospital will dramatically reduce the speed of recovery and increase the risk of re-admission.

The referral scheme has been recently introduced directly into hospital settings with the provision of a dedicated case-worker to offer advice to patients prior to discharge on a wide range of topics including insulation and heating improvements and managing energy use. Similarly, identification and referral of vulnerable patients by GPs and community staff would increase the rate at which poorly insulated and draughty homes are addressed.

Likewise, the Priority Service Register identifies patients receiving treatment at home who are dependent on an uninterrupted power supply for medical support devices such as oxygen pumps, for priority re-provision should a power supply fail.



Image 18: BNSSG-wide Hospital-based case worker for WHAM service

#### 5.1.4 Health Promotion

Health promotion for all is the key. Staff, patients, visitors and our local community should all benefit from health promotion awareness campaigns encouraging good health and wellbeing amongst the general population.

Examples of national and regional care campaigns include Stay well this winter, the flu fighter campaign, smoke free, eat well and sugar smart among others.

Health promotion of the general population is vital to reduce the demand on our services in the future; however our healthcare services are also reliant on the resilience of staff health to ensure operational continuity of care.

Staff health and wellbeing is therefore critical to ensuring the workforce is resilient. A workforce wellbeing programme is essential to keep staff motivated, valued and physically well enough to carry out their vital work across our regional health and care system.

The promotion of staff health and wellbeing could include;

- Personal resilience
- Vaccination programmes
- Active Travel
- Access to high quality green space
- Access to healthy food choices
- Lunchtime walks
- Mindfulness and exercise classes
- Healthy eating

It is important these health promotion and resilience messages are reinforced system wide through our health and social care communications teams, and also by our own staff, to help patients make the link between their actions and their health. By doing so, we are all contributing to further promoting to good health and the prevention of avoidable illness.



Image 19: NBT sustainable travel campaign

## 5.2 Non Clinical Solutions

The non-clinical side of healthcare can be somewhat overlooked, however the resilience of our estates, services and supply chain are fundamental to providing sustainable healthcare in a changing environment.

Where we locate these non-clinical services geographically across our region is also vital. Consideration should primarily be given to future service user needs, but also space optimisation across our BNSSG sites and services to enable greater efficiencies are achieved.

The development of BNSSG wide regional support services could prove vital in ensuring local provision to reduce the reliance of services outside of our region.

This section reviews the ways in which we can adapt to climate change in the following areas;

- Resilient Infrastructure
- Service Adaptation
- Supply Chain Security

### 5.2.1 Resilient Infrastructure

Ensuring the integrity of our infrastructure is paramount to becoming resilient. Sustainable design and construction is critical to ensure our existing and future healthcare estates are robust and capable of meeting future challenges.

However, space optimisation is also crucial to ensure that any competing or complimentary uses are considered as part of any Estate Strategy.

External and underground spaces and surfaces such as walls, roofs, paths, hardstanding and green spaces can be used in many ways that support climate adaptation and resilience. For example, therapeutic gardens, encouraging biodiversity, growing food, generating energy, generating heat, treating water, preventing flooding, parking vehicles, shading buildings, siting equipment (such as HVAC units, or water tanks). However, these spaces may also be required for construction of new facilities or services onsite, and therefore also compete for use.

Given the opportunity for both competing and complementary uses, it may be worth developing a set of guidelines, or hierarchy outlining how much outside space (including wall and roof spaces) there should be, and how its use is optimised. The protection and enhancement of outside space also supports the protection of biodiversity which has been declining significantly in recent years and which has been worsened by the impacts of climate change.



Image 20: Solar shading above windows at Southmead Hospital Pathology Building

The following recommendations from Bristol Local Planning Authority (2012) and NHS England are laid out below.

- BREEAM for Healthcare (Excellent)

*i) Infrastructure layout & design*

- Layouts allow sufficient space between buildings to enable cooling. Street trees provide shade and buffer wind.
- Accessible external space is provided wherever possible,
- External spaces include an element of shade through measures such as trees, canopies and awnings.
- Passive cooling
- Living walls and green roofs help to cool and shade buildings.
- Sufficient internal space has been provided to promote natural ventilation
- Open-able windows provided

*ii) Built infrastructure*

- Substantial insulation and / or wall thickness to prevent overheating

- Natural ventilation and daylighting
- Mechanical ventilation with heat recovery
- Good levels of airtightness
- Orientation to maximise solar gain
- Solar shading on south facing glazing to avoid overheating during hotter weather; and
- Tree planting to provide summer shade

*iii) Energy generation*

- Combined Heat and Power (CHP)
- Responsive heating controls
- Building management systems and Intelligent lighting systems
- Flexibility and adaptability to enable changes in future use
- Renewable energy generation (solar, wind, district heating)
- Energy efficient appliances

*iv) Water and flood risk infrastructure*

- Sustainable Urban Drainage systems (SUDs);
- Attenuation ponds
- Flood resilience measures (if applicable)
- Water efficient appliances
- Rainwater harvesting



Image 21: Southmead Hospital Solar Panels, Learning and Research Building

*v) Green infrastructure*

- Maximising planting and use of green space to promote biodiversity
- The use of drought tolerant species
- Indigenous and nut or fruit bearing trees and bushes specified in landscaping
- Wildflower planting
- Tree / shrub planting

*vi) ICT infrastructure*

- Robust, secure ICT systems which can cope with extreme heat/cold and with emergency backup power

*vii) Transport infrastructure*

- Adopt recommendations from the NICE Guidance on Air Pollution: Outdoor air quality and health (2017)
- Maximise sustainable travel
- Resilient transport fleet (electric, hybrid)
- Resilient road systems
- Sustainable travel infrastructure (cycle parking, public transport services, accessible)



Image 22: Sustainable Urban Drainage at Southmead Hospital

### **5.3 NHS Service Adaptation**

Given the evidence, there are increased and more frequent risks of extreme climate related events in the future, which will ultimately increase the demand on our services.

The local health and care system must ensure the impacts of climate change have been considered within their organisation-wide strategies taking into account the clinical and non-clinical impacts and establish adaptation methodologies are adopted system wide.

In line with the Civil Contingencies Act 2004, local healthcare services should ensure emergency preparedness and response procedures are in place to deal with incidents and emergencies while maintaining services to patients.

Business Continuity Management Plans should be drawn up and reviewed on a regular basis to ensure the response to emergency situations is well managed and involves local collaboration with other BNSSG members and other agencies.

Business continuity plans should endeavour to address the potential impacts of climate change to ensure organisations are prepared.

Emergency situations arising from potential climate change impacts include extreme weather (flooding, snow, storm events), drought, fuel, energy or water shortages etc.

By ensuring organisations have included climate change adaptation within their estate and clinical strategies, have workable and regularly rehearsed plans, they should be well placed to respond and limit any disruption to operational and clinical services as part of the smooth running of service delivery.

### 5.2.3 Supply Chain Security

The delivery of healthcare services is critically dependant on the provision of medical supplies and services provided by third parties as part of the supply chain. The resilience of the supply chain is therefore crucial to achieving this.

#### *i) Clinical Supplies*

Continuity of the supply chain is vital to the healthcare service. The commissioning and procurement of goods and services must consider the acute shocks and chronic stresses of climate change on any goods or services procured.

The commissioning and procurement processes in place must review and assess the risks posed by a changing climate to the security and continuity of supply.

This should be built into the tender specification of any new product.

#### *ii) Commissioned Service & Utility Contracts*

The provision of service and utilities contracts is also a critical part of service delivery.

The commissioning and procurement of service providers such as private healthcare, catering suppliers, linen and laundry services, waste disposal, patient transport, anaesthetic gases etc. must be able to demonstrate their own business continuity plans as part of the procurement tender process to ensure the supply of critical services is not impacted by events such as extreme weather.

The provision of utilities such as electricity, water, gas, etc. is another crucial element of continuity planning. The utility provider should have emergency plans in place to ensure the hospital is not left without critical supplies for any length of time.

Local health and care services must ensure their sustainable procurement strategies reflect climate change adaptation, ensuring that suppliers, contractors and utility companies have emergency preparedness and response included within their business continuity plans which reflect climate change impacts and mitigation measures to ensure the availability of critical supplies to our sites.

Ensuring resilience across the network will also help with prices, enabling health and care organisations to be more self-sufficient where possible.



Image 24@ North Bristol NHS Trust Operational Services; Receipt and Delivery, Brunel Building, Southmead Hospital

#### 5.2.4 Social Infrastructure

The concept of a resilient social infrastructure is driven by the wider determinants of health.

It is recognised that many factors combine together to affect the health of individuals and communities and whether people are healthy or not is often determined by their circumstances and their local environment (World Health Organisation).

The physical environment and the provision of accessible, high quality community facilities, clean air and water and access to green space for our community is vital to ensure a resilient social infrastructure.

As the physical and social context of people's lives often determines their health, we as health and care organisations need to maximise our positive impact on our local communities to provide services which promote and encourage these communities to adopt resilient practices.

The provision of high quality community facilities as part of our STP estate strategy is paramount to strengthen the delivery of an integrated health and care system which promotes the future health of our communities.

Opportunities to promote resilience and social infrastructure include;

- 'One Public Estate' - services within and for the local community
- Community facilities at existing sites
- Supporting local community groups
- Social prescribing
- Food growing
- Therapy gardens
- Arts and music programmes
- Community transport provision e.g. community car clubs, transport hubs, bus services, etc.
- Exercise e.g. green gyms, walking trails and other exercise classes



## 6. Are you climate ready?



Image 25: South West Ambulance NHS Foundation Trust, Land Rover 2018

## **6.1 Climate Adaptation Risk Assessment**

To support this adaptation plan, a Climate Adaptation Risk Assessment template has been produced.

The Climate Adaptation Risk Assessment identifies the significant risks facing health and care processes, premises, providers and people and sets out the adaptation and mitigation actions required.

Local health and care providers can use the template as a starting point to help identify the specific risks and mitigation measures which apply specifically to them.

## **6.2 Implementation**

Adaptation and mitigation risks identified within the risk assessment should be recognised and implemented across the health and care system through the following adaptation outcome categories;

- Strategy
- Business Continuity
- Evidence (monitoring)
- Collaboration

This work will be delivered through joint working across the STP, sharing of best practice and working together.

## **6.3 Review**

The STP Estates Group will review progress against actions.

## **6.4 Reporting**

The STP Estates Group will report progress on the Climate Change Adaptation Plan on an annual basis.

## **6.5 Carbon Reduction Plans**

Whilst climate change mitigation efforts, or carbon reduction, are separate from the work required to successfully identify the risks and opportunities that climate change brings for public sector organisations, it is of course related.

Within the BNSSG STP, work to reduce carbon emissions is well underway and will be formalised through the production of carbon reduction plans. This work will be also overseen by the STP Estates group.

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## 8. Appendixes

### 8.1 Climate Change Risk Assessment Template

