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# Addressing Climate Change through the Surrey Heath Local Plan

## A report to inform Local Plan preparation

September 2020

**Quality information**

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# Executive summary

AECOM was commissioned in early 2020 to prepare a report aimed at exploring how climate change objectives, both in respect of mitigation and adaptation, might most effectively be addressed through the emerging Surrey Heath Local Plan. More specifically:

- **Climate change mitigation** - the aim is to understand the likely future trajectory of de-carbonisation within Surrey Heath and then explore Local Plan interventions to increase the speed of decarbonisation and therefore bring forward the date for achieving net zero emissions.
- **Climate change adaptation** - in a similar fashion, the aim is to understand anticipated climate change impacts and then explore Local Plan interventions to reduce risk and strengthen resilience.

There is a particular focus on identifying how the Local Plan might respond to climate change through setting a **spatial strategy**, i.e. by allocating sites and assigning a quantum of development / mix of uses to each. However, there is also a focus on how the Local Plan can respond through setting development management policy, i.e. **policy** to guide decisions on planning applications. Additionally, this study explores certain ways in which the Council might respond to climate change through its **wider functions**, where there are links to the Local Plan.

This report considers climate change mitigation and adaptation in turn, in both cases exploring three key questions:

- What is the context?
- What is the baseline scenario?
- What are the intervention options feasibly open to the Council?

## Part 1: Climate change mitigation

### What is the context?

There is a raft of international and national context with a direct bearing on preparation of the Local Plan, but a logical starting point is the "**2050 Target Amendment**" to the Climate Change Act (2019), which introduced a national net zero target, following the international Paris Agreement of 2015.

A high proportion of Local Planning Authorities (LPAs) nationally subsequently declared a **Climate Emergency** and set their own target dates for achieving net zero. Surrey Heath Borough Council ('the Council') declared a Climate Emergency on 9th October 2019 and, at the same time, committed *the Council* to achieving net zero by 2030. It is important to note that no target date has yet been set for Surrey Heath Borough as a geographic area. This approach is not uncommon amongst local authorities nationally and locally, although a number of authorities are going further. Basingstoke and Deane Borough Council, for example, is committed to borough-wide carbon neutrality by 2030, with the Council 'leading by example' by achieving carbon neutrality by 2025.

With respect to the Local Plan, the National Planning Policy Framework (**NPPF**, 2019), which establishes principles, policies and procedures to guide Local Plan preparation, sets out policies on, and relevant to, climate change. Local Plans must accord with the NPPF, hence Part 1 of this report concludes by presenting a checklist of NPPF requirements, including that Local Plans *"contribute to radical reductions in greenhouse gas emissions"*.

The context review then goes on to explore:

- The Committee on Climate Change (**CCC**)'s report on "Net Zero" (2019) – the CCC is the Government's official adviser on climate change, hence their recommendations are a material consideration for Local Plans; however, it is important to recognise that many recommended policy interventions are of limited relevance to Local Plans. What does come through strongly though is a need to focus on decarbonising transport and heating.
- Guidance for Local Plans – the official guidance is the Planning Practice Guidance (**PPG**) on climate change; however, this largely dates from 2014. The Royal Town Planning Institute (**RTPI**) produced guidance for Local Plans in 2018; however, even since this time understanding has moved on at pace.
- Decarbonising **transport** – Government published Decarbonising Transport in March 2020, ahead of a full Transport Decarbonisation Plan. The report begins by setting out the scale of the challenge:
  - Transport overtook power supply as the largest source of emissions nationally about four years ago;
  - Transport emissions will decrease significantly, but at a rate well short of what is required for net zero;
  - Passenger car emissions dominate but are decreasing, whilst van and HGV emissions are increasing.

The Government identifies strategic priorities to include: accelerating modal shift to public and active transport; supporting electric vehicle (EV) take-up, including by delivering charging infrastructure and supporting electricity network readiness; transforming 'last mile' deliveries; and, more generally, delivering "place-based solutions", including with a view to minimising the need for people to travel in the first place.

- Decarbonising **heating** – it is difficult to overstate the scale of the challenge posed by Government's commitment (2019 Spring Statement) to see *"the end of fossil fuel heating systems in new homes from 2025"*. The UK has lagged behind other comparable nations in respect of decarbonising heating, but there will now need to be a rapid shift to the use of electricity for heating, and specifically the use of heat pumps.[1]

  Work is ongoing nationally to understand how best to roll-out **heat pumps** across different development contexts, and also retrofit existing buildings. For Local Plans a key point to note is that heat pumps can work most effectively when delivered as part of a **heat network** (or 'district heating' scheme), where heat is shared between buildings and/or drawn from a communal source (e.g. an open space, water body or sewage works).

  Aligned with this, there is a focus nationally on rapidly increasing **fabric standards** within new and existing buildings, in order to minimise need for winter heating and summer cooling. Work is also ongoing to explore ways to ensure thermal efficiency (and support solar PV) through building location, orientation and design.

- The **Future Homes Standard** (FHS) – over recent years there has been a focus on exploring ways in which Local Plans can viably require the achievement of $CO_2$ emissions standards for new homes that exceed the requirements set by Building Regulations. However, in late 2019 Government consulted on a single national standard, known as the 'Future Homes Standard', which would achieve a 75-80% reduction on current requirements by 2025. The proposal is to require a high proportion of reductions through high efficiency / fabric standards, with remaining reductions via heat pumps / heat networks and solar PV.

  It is important to note that the Building Regulations and FHS deal with the *operational* emissions only, and specifically those that are *regulated* (due to being linked to building design), as opposed to *unregulated* (e.g. from plug in electrical goods). Additionally, there is a need to minimise **whole life & embodied emissions** of buildings, for example emissions relating to construction (including embodied carbon in building materials), retrofitting and demolition. Such emissions will comprise an increasing proportion of total emissions over a building lifecycle, as operational emissions decrease (due to electrification combined with grid decarbonisation).

- Transforming the **electricity network** – decarbonisation and decentralisation of electricity generation, alongside significant changes to peaks in demand due to the electrification of heating and EVs, will lead to major electricity supply challenges. There will be a need for both innovative demand-side responses (e.g. tariffs that reward consumers for changing how and when they use electricity) and the use of batteries to store surplus electricity, e.g. solar PV generated electricity on sunny day for use that evening when demand is highest.

- **Hydrogen** – work is ongoing to explore the role of hydrogen as a fuel for transport (it will have a role for heavy vehicles not suited to electric, and may have a role for personal vehicles) and heating (which may or may not be able to utilise existing gas infrastructure); however, implications for the Local Plan are currently limited.

- **Covid-19 recovery** – at the time of writing there is much discussion of the potential for a 'green' economic recovery following the Covid-19 pandemic and the national lockdown, with the opportunity taken to:
  - create jobs in green growth sectors including energy efficiency, the electrification of heating, renewable power, electric vehicles, electricity transmission and storage, transport and green infrastructure;
  - take the positives from the common experience of national lockdown, including realising what the Transport Secretary has called "*a once in a generation opportunity to deliver a lasting transformative change in how we make short journeys in our towns and cities"*; and
  - ensure that the nation is well prepared for risks akin to a pandemic moving forward, including the direct, indirect and cumulative impacts of climate change.

  There have been many contributions on this subject, including from the CCC, the RTPI and industry bodies. The RTPI recently published *Plan the World we Need*, which begins with the following statement: *"To recover from Covid-19, we need to make plans. These must be holistic in nature, integrated in structure, and resourced for delivery. They need to accelerate progress to a zero carbon economy, increase resilience to risk, and create fair, healthy and prosperous communities."* Most recently, the UK Climate Assembly (September 2020) found that 79% of the assembly 'strongly agreed' or 'agreed' that *"steps taken by the government to help the economy recover should be designed to help achieve net zero"*; and 93% equally supported the statement: *"As lockdown eases, government… [should] encourage lifestyles to change to be more compatible with reaching net zero"*.

[1] A heat pump as a device for cooling or warming an enclosed space by removing heat from interior air and transferring it out (as per a refrigerator or air conditioner), or by absorbing heat from outdoor air, or from a hot-water source, and transferring it in.

## What is the baseline scenario?

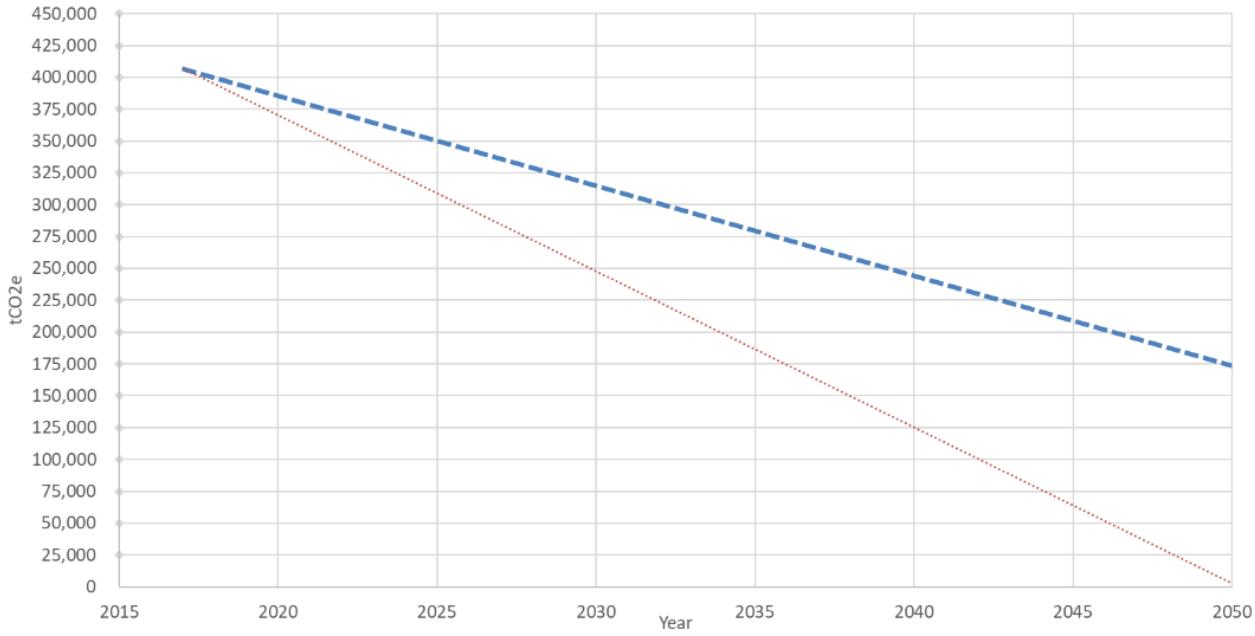
Accurately calculating $CO_2$ emissions associated with the population, public sector and business activities within any given local authority area is **challenging**. A methodology has been developed and applied for the purposes of this study, and is presented alongside a clear set of limitations and caveats. It will be for the Council to decide whether to apply this methodology for monitoring over time, or develop an alternative methodology. It is, of course, important that a consistent methodology is used for monitoring emissions over time.

Having made these initial points on the methodology, there is a need to summarise the findings of work completed to calculate the **baseline decarbonisation scenario**, i.e. anticipated reduction in greenhouse gas (GHG) emissions, over time, on the assumption that Surrey Heath Borough sees the benefit of anticipated national trends - in particular, in respect of decarbonisation of electricity and the electrification of heating and transport - but that difficult policy decisions are not made locally, including through the Local Plan, to accelerate decarbonisation.

In practice GHG emissions were calculated for two dates, 2017 and 2040, with the decarbonisation trajectory between these two points then projected forward to 2050, as the net zero target date (in the absence of an established local target). Figure A presents the calculated decarbonisation trajectory, and also compares it to a **"2050 net zero" trajectory**.

The gap between these two trajectories – i.e. the difference between a c.**40%** reduction by 2040 versus a c.**70%** reduction by 2040 - represents the scale of the challenge for the Borough and, whilst the Local Plan cannot close the gap on its own (e.g. because it cannot readily influence the existing building stock), it must nevertheless endeavour to respond to the scale of the challenge.

*Figure A: The calculated baseline decarbonisation scenario and a 'net zero 2050' scenario*




Figures B and C present the **breakdown of emissions** in 2017 and 2040 under the baseline decarbonisation scenario. Key points for the Local Plan, include:

- Domestic and transport emissions dominate (with domestic highest, contrary to the national picture where transport emissions predominate);
- Emissions from transport are set to decline significantly under the baseline scenario, but are still set to be a major source of emissions in 2040, and there is potential to address this through the Local Plan; and
- Industry and commerce emissions are also significant, but there is less potential for the Local Plan to effectively address these.

*Figure B: Breakdown of current baseline emissions for Surrey Heath Borough[2]*

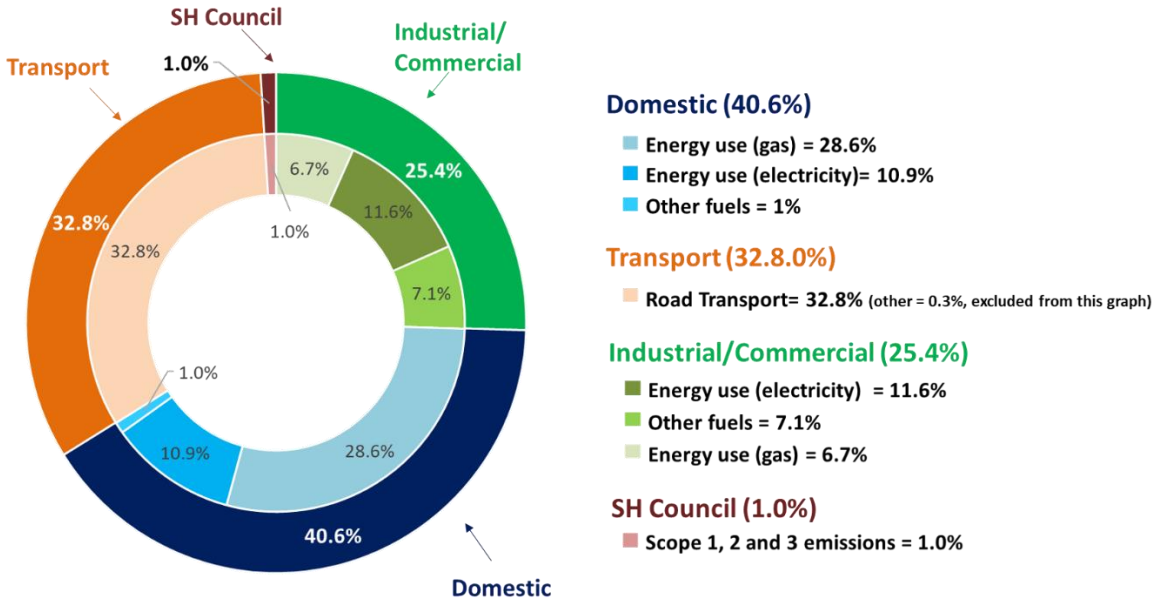
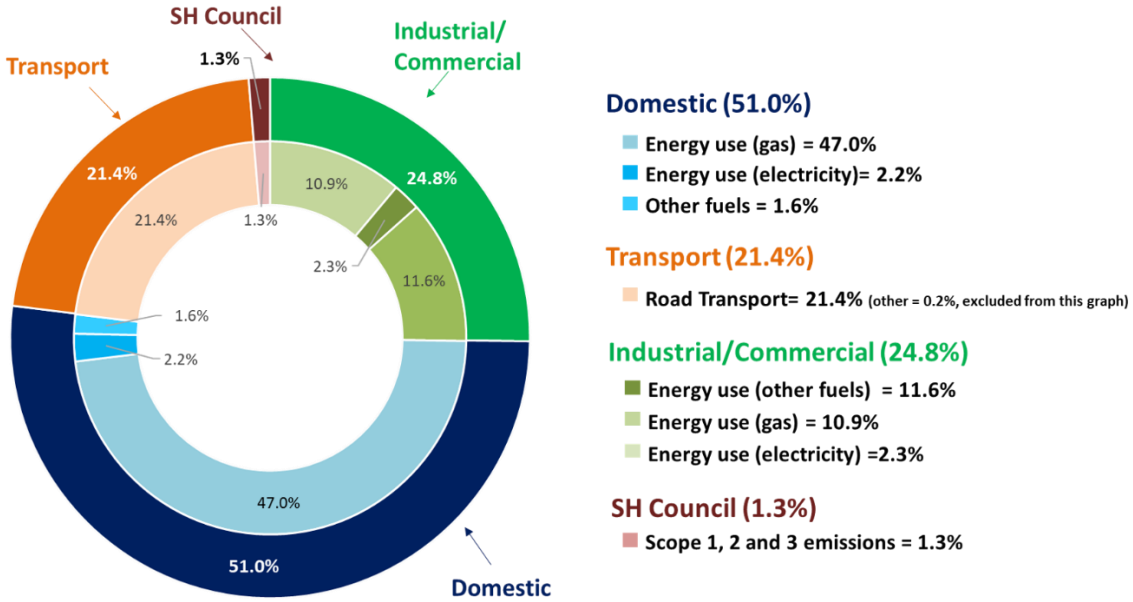



*Figure C: Breakdown of estimated emissions in 2040 for Surrey Heath Borough[2]*




## What are the intervention options feasibly open to the Council?

The aim is to present a discussion of key steps towards accelerating the decarbonisation trajectory that the Council might take through the Local Plan or, in other words, a review of the Local Plan **intervention options** that could feasibly be explored as part of Local Plan preparation. The discussion aims to be:

- **Focused** - in that it avoids straying into a discussion of policy options that are not within the remit of the Local Plan, e.g. in respect of existing buildings and many aspects of power and transport infrastructure; and
- **Realistic** - recognising that the Local Plan must balance wide-ranging competing objectives – in particular environmental objectives, given the extent of international biodiversity designations and near ubiquitous Green Belt coverage – and work within the bounds of what can viably be delivered by the development industry.

[2] When calculating an organisation's emissions there is a need to differentiate between: Scope 1 emissions (all direct emissions, primarily from fossil fuel combustion by gas boilers and fleet vehicles); Scope 2 emission (indirect emissions mostly associated with the electricity purchased and used by the organisation, where the actual burning of fossil fuels occurs elsewhere); and Scope 3 emission (indirect emissions that result from the activities of business travel, procurement spend, and emissions associated with the production, transportation, transmission and distribution of scope 1 and 2 fuels and electricity).

The review is presented under broad categories of intervention: Spatial strategy; Masterplanning and design; Buildings emissions standards; Heat networks; Renewable power; Low carbon transport; and Other interventions.

The review recognises that there is a distinction between proactively directing growth to certain locations and defining how particular developments and places should be shaped with setting higher level, borough-wide policy to guide future decision-making. There is a balance to be struck, as the Local Plan cannot be overly prescriptive; however, from a climate change perspective, there is much to be gained from taking a proactive approach and, indeed, this is a requirement of the NPPF (para 149). There is a need to avoid relying on GHG emission reductions from well-intentioned high-level policies that are not effectively implemented, in practice, on viability grounds.

Part 1 of the main report concludes by listing the NPPF requirements, in respect of climate change mitigation, and summarising how these might be most effectively met by the Surrey Heath Local Plan. Key conclusions include:

- Concentrations of growth / **strategic growth locations** can offer particular opportunities and, in Surrey Heath, the regeneration of Camberley Town Centre represents an important opportunity, for example in respect of delivering a high quality heat network and a future proofed transport network. There is a need to consider the scale of growth that will best support the achievement of such objectives.
- Certain **locations for growth** can offer particular opportunities, first-and-foremost in respect of GHG emissions from transport, but also emissions from the built environment. For example, the potential to deliver a heat network is maximised where, as the NPPF says, there is *"colocation of heat customers and suppliers"* or, as the Future Homes Standard consultation document says, there is *"a unique opportunity to exploit larger scale, renewable and recovered heat sources that can't be accessed at an individual building level."*
- The primary energy supply consideration is in respect of low and zero carbon (LZC) **heat**, given the national and local context, and given the remit and scope of the Local Plan; however, the Local Plan can also play a role in supporting LZC **power**, in particular solar PV, EV charging infrastructure and battery storage. Hydro power could also feasibly be an option along the River Blackwater.

  The Local Plan can direct future housing and employment growth to sites best able to deliver LZC infrastructure onsite, and there is also the potential for the Local Plan to set policy criteria to guide subsequent planning for LZC infrastructure, whether that be via a Neighbourhood Plan or a planning application. The Local Plan might also go further ("a proactive approach") by identifying areas of search for LZC infrastructure, or go even further by allocating land. The Green Belt designation is likely to preclude wind power and also constrain battery storage; however, national support for onshore wind has increased following a recent (2020) Government announcement, and views on the important role of large-scale battery storage are evolving rapidly.

  In respect of solar PV, there is a need to facilitate and guide **community energy** initiatives, which have clear NPPF support, and there is also increasing precedent nationally for local authorities to take a **proactive leadership** role, raising funds, convening stakeholders and market actors, communicating ambitions to the public and putting in place management structures to support solar PV. This can align with other Council climate change mitigation initiatives, including in respect of low carbon heating, transport and retrofitting existing building stock. **Solar car ports** are one example of what can be delivered, demonstrating best practice integration of solar PV, battery storage and rapid EV charging.
- **Masterplanning and urban design** – the National Design Guide supports the "three Cs" of Climate, Character and Community, and Local Plan policy / site specific requirements can help to ensure walkable neighbourhoods, transport connectivity and heat networks in particular. The Local Plan can set masterplanning and design policy, including for strategic sites, but must avoid being overly prescriptive, as there is a need to ensure appropriate room for manoeuvre at the planning application stage, responding to fine-grained issues and opportunities.

  Similarly, Local Plan policy can seek to reflect best practice approaches to **building design**, for example in respect of building orientation, glazing ratio, roof shape, shading, ventilation and 'form factor' (the ratio of internal to external surface area), in order to maximise thermal efficiency (i.e. minimal need for winter heating whilst avoiding summer overheating); however, again, there is a need to strike a balance, enabling developers flexibility to achieve emissions requirements (discussed below) in innovative ways, using latest technologies.

  Setting requirements in respect of **parking** provision is a related consideration; however, this is a complex policy area, including due to the fragmented governance picture, which sees Surrey Heath County Council responsible for some aspects of parking provision and Surrey Heath Borough Council responsible for others. Attention can focus on the question of whether policy should prescribe the number of parking spaces required for each new home granted permission, set a maximum figure, set a minimum figure or allow flexibility.

- Ahead of a Government decision on the Future Homes Standard there remains a need to consider setting local requirements in respect of exceeding the **GHG emissions requirements** of Building Regulations, which is a powerful tool (because emissions are objectively quantified, albeit methodology is a subject of debate).

  Some local authorities are leading the way by setting very stringent requirements to include achievement of **net zero** emission major developments (which requires not only high efficiency / fabric standards and LZC onsite heat and/or power generation, but also financial contributions to offsetting residual emissions), and there are arguments to suggest that 'net zero' developments must be required now, if the national net zero target is to be achieved. However, recognising that a high proportion of forthcoming planning applications in **Surrey Heath** will be for smaller to mid-sized schemes, it may be that any Borough-wide policy should align with the more ambitious of the two FHS options recently consulted-on (which is ambitious but falls short of delivering net zero), with specific policy additionally set for Camberley town centre and any major developments.

  Also, regardless of the outcome of the FHS consultation, it will be (at least to some extent) within the remit of the Local Plan to set policy to guide *how* emission standards should be achieved, potentially including in respect of the **energy hierarchy**, i.e. the extent to which there should be a 'fabric-first' approach that sees heat and power use minimised ahead of relying on LZC generation. However, once again, there is a need to avoid unduly constraining work to explore detailed evidence, issues and options at the planning application stage.

  Finally, it is important to note that Building Regulations and the FHS deal with the operational emissions of buildings, but do not consider the **embodied carbon**, or seek to tackle other emissions associated with the **whole-lifecycle** of buildings, which leaves a clear space for Local Plan policy intervention. Work is ongoing nationally to understand best practice principles, and what is realistically and viably achievable. For example, there is discussion of modular building and other 'modern methods of construction', and there is increasing recognition of the need to refurbish existing buildings where possible, in preference to demolition.

- **Transport** - there is a need to align work on spatial strategy and site selection with understanding of issues and opportunities for public transport infrastructure / services, walking and cycling infrastructure, EV charging and "future mobility" concepts including "mobility as a service" and micro-mobility (including for last mile deliveries). Close working with the County Council is crucial, including with a view to achieving a 'whole system smart' EV charging network, recognising the need for different types of charge point (rapid journey charging, so-called fast grazing charging (e.g. at supermarkets) and trickle-speed home and work charging) integrated with solar power generation and battery storage (including recognising that EV batteries can assist with supply/demand balancing, releasing power to households at peak times and then charging over-night).

- **Other matters** – ambitious national targets are in place to drive **tree planting** for carbon sequestration, and there is a role for the Local Plan; however, in the Surrey Heath context the realistic potential for carbon savings through the Local Plan is small when compared to the intervention options discussed above, plus there is a need to bear in mind the extent of heathland landscapes across the Borough not suited to (further) afforestation.

  Another matter is the need to support a **low carbon economy**, which is a priority nationally, including through the NPPF, and also a priority of the Enterprise M3 Local Enterprise Partnership (LEP). In practice, this primarily means implementing interventions discussed above, many of which may support green jobs; however, the Local Plan might also need to consider the employment land needs of green growth sectors and clusters.

  Finally, there is a need to consider the matter of **retrofitting** existing buildings in support of decarbonisation, which is a major nationally, including for economic reasons (e.g. given the large labour force that will be required to replace the estimated 25 million gas boilers nationally, and deliver significant fabric standard improvements for an estimated 10 million homes); however, this is a matter of limited relevance to the Local Plan.

# Part 2: Climate change adaptation

## What is the context?

Climate change adaptation is a highly cross-cutting topic; however, there is an established process in place nationally to distil key issues for policy and plan-makers. Specifically, the Climate Change Act requires an iterative process of preparing and regularly updating a Climate Change Risk Assessment (CCRA) and National Adaptation Programme (NAP), with ongoing scrutiny by the CCC's **Adaptation Sub Committee** (ASC).

The most recent ASC progress report is from 2019, with key findings including:

- The priority given to adaptation has been eroded over the past ten years;
- England is still not prepared for even a 2°C rise in global temperature, let alone more extreme levels of warming;

- Many plans and policies still lack a basic acknowledgement of long-term climate change, or make a passing mention but have no associated actions to reduce risk.

The ASC progress report concludes: *"Leaving adaptation responses to local communities and individual organisations without a strategic plan is not a strategy to manage the risks from climate change. Climate change impacts and adaptation are associated with* ***market failures, and institutional or behavioural barriers*** *that require Government intervention… For individual businesses, organisations or the public, it is extremely challenging to build awareness and take adaptation actions at a scale that is effective and efficient, and that accounts for social costs and benefits…"* [emphasis added]

A second port of call is the **NPPF** (2019) and the PPG (which mostly dates from 2014). Focusing on the NPPF, paragraph 148 identifies the objective to *"minimise vulnerability and improve resilience"* with a particular focus on flood risk. Paragraph 149 then identifies the need to take into account *"… the long-term implications for flood risk, coastal change, water supply, biodiversity and landscapes, and the risk of overheating from rising temperatures…"*

Further important context, comes from:

- Recent national survey findings - serving to demonstrate increasing **public concern** about the impacts of climate change which, in the absence of binding targets (as per decarbonisation) serving as a call to action.
- Lessons learned from the **Covid-19** pandemic and national lockdown – for example, the RTPI has recently published two reports ("Priorities for Planning Reform" and "Planning the World we Need") that include clear calls to ensure that lessons learned translate into actions in respect of planning for future resilience to climate change and other systemic shocks that the nation might face, with these reports building on another report prepared by the RTPI in early 2020 entitled *Five Reasons for Climate Justice in Spatial Planning*.

## What is the baseline scenario?

Whilst it is not possible to quantify the **current situation**, in respect of climate change impacts / adaptation, in the same way as it is possible to quantify carbon emissions, evidence of the need to better adapt to the effects of climate change is clear:

- **Observed climate change** - for example, all the top ten warmest years for the UK, in the series from 1884, have occurred since 2002;
- Recent **extreme weather events** - over recent years Surrey Heath has experienced several extreme weather events that have resulted in flooding, heatwaves and droughts, for example February 2020 saw UK-wide flooding brought about by Storm Ciara and Storm Dennis; and summer 2018 was the UK's warmest summer since 2006 and the driest since 2003, with wide ranging impacts, including a high incidence of wildfires;
- Current **flood risk** - a Strategic Flood Risk Assessment (SFRA) is in preparation, setting out spatial understanding of existing flood risk from all sources, most notably fluvial and surface water.

  A key step is to is to split flood zone 3 (as understood from national mapping) into **zone 3a** and **zone 3b**, as national policy stipulates that housing uses are inappropriate in zone 3b and that any housing development in zone 3a must pass the nationally defined Exceptions Test (although it is also important to note that housing in any flood risk zone, i.e. in **zone 2** or higher, must also pass the Sequential Test).

  Finally, in respect of existing flood risk, there is a need to consider those locations that are subject to flood risk *and* potentially more **vulnerable**, for example because the community is more deprived, as understood from the national Index of Multiple Deprivation (2019). Such areas are concentrated in the west of the Borough, and one neighbourhood stands-out in particular (in the vicinity of the M3/A331 junction, west of the B3411). Outside of the main urban area, Bagshot is also associated with both a degree of flood risk and relative deprivation.
- **Water resources and water quality** - a Water Cycle Study (WCS) has been prepared to inform the Local Plan, which has highlighted issues around wastewater management (which is a climate change adaptation consideration as drought and flood scenarios lead to challenges and, in turn, a risk of water pollution). There are three wastewater treatment works (WwTWs) in the Borough, with Camberley and Lightwater WwTWs shown to be constrained, in terms of hydraulic capacity to accept additional flows and/or capacity of the receiving water body to accept additional treated water (whilst maintaining required water quality levels).
- **Heat vulnerability** - work to map heat vulnerability at the strategic level has been undertaken through the Social Heat Vulnerability Index (SHVI) initiative, taking account of a range of criteria relating to the physical environment and population characteristics (e.g. older people are more vulnerable). Somewhat unsurprisingly, heat vulnerability is found to be concentrated in the Borough's western urban area.

Looking to the **future**, the latest UK Climate Projections (UKCP) dataset (UKCP18), predicts increasingly milder, wetter winters and hotter, drier summers. However, of greater relevance to the Local Plan is latest understanding of UK climate change risks, as established by the CCC ASC. Appendix I of this report reviews the relevance of nationally established risks to the Surrey Heath Local Plan, finding the following risks to be of greatest relevance:

- **Risks to public health from high temperatures** - as well as heat stress, high temperatures can lead to a range of secondary and indirect impacts, for example in respect of strain on health and social care, poor air quality and risk of vector borne diseases.
- **Risks to communities and businesses from flooding** - in the case of Surrey Heath a key issue is the extent to which increased rainfall and storminess will expand flood zone 3a (flood zone 2 is also a consideration). The SFRA models expanded flood zone 3a; however, there are uncertainties with any modelling exercise. For example, changes to land management practices in response to climate change could lead to increased rates of surface water run-off and/or increased soil erosion, leading to increased flood risk.
- **Risks to communities, businesses and the natural environment from wildfires** - increased risk of wildfires is a concern in Surrey Heath given the extent of heathland and former heathland, with a major wildfire experienced on Chobham Common in August 2020.
- **Risks to infrastructure** - a range of critical infrastructure can be damaged, or fail to operate at full capacity, due to storms, flooding and high temperatures. Drought also impacts hydro-electric power generation, and both droughts and storm events can also have implications for effective wastewater management. Another consideration is decreased use of public transport due to high temperatures.
- **Risks to farming and forestry** - farming will be impacted by changes in climate and weather patterns and an increase in extreme weather events. There is also a need to consider changes to soil structures, and issues of soil erosion due to aridity over summer months combined with heavy rainfall events over the winter months.
- **Risks to the natural environment** - climate change will impact on species populations and, in turn, the integrity of ecosystems at a range of scales, with knock on implications for the provision of 'ecosystem services' that support communities and the economy. Flood risk attenuation is one key ecosystem service, and another example, or relevance to Surrey Heath, is carbon storage by peatland soils.
- **Risks to the built environment** - high temperatures and extreme weather pose a risk to historic buildings in particular. There will be a need to retrofit the existing building stock nationally in order to adapt to high temperatures and also support decarbonisation; however, retrofitting older buildings poses challenges.

## What are the intervention options feasibly open to the Council?

The aim is to present a discussion of key steps towards increased **resilience and adaptation** to the anticipated impacts of climate change, again (as per the discussion of mitigation, above) with a **focus** on what is within the remit and scope of the Surrey Heath Local Plan, and with an understanding of what is realistically achievable.

The review is presented under the following headings: Spatial strategy and site selection; Masterplanning and urban design; and Development management policy.

In respect of **spatial strategy and site selection**, key considerations are:

- **Flood risk** - a clear regime for avoiding development in flood risk zones is presented within the NPPF and the PPG, yet building new homes in locations where they are at risk from flooding persists nationally.

  If the Local Plan is to propose housing or other vulnerable uses in the flood zone (N.B. it is also important to recall that any building in the flood zone can reduce flood storage capacity leading to downstream flooding) then the sites in question will need to pass the **Sequential Test**, which means demonstrating that there is not an alternative approach that would achieve the same development objectives with lower associated flood risk. This is an inherently challenging task, and the task for the Local Plan is to take a proportionate approach.

  Having passed the Sequential Test, sites must then also pass the **Exceptions Test** *if* housing is proposed in flood zone 3a (taking account of the climate change modelling presented in the SFRA). Again, a key challenge is to ensure an approach that is precautionary yet proportionate to the stage in the planning process. This means ruling-out sites where there is judged to be insufficient ability to avoid (e.g. through delivery of greenspace) or mitigate (e.g. through sustainable drainage and building design measures) flood risk and/or insufficient evidence of development benefits that serve to outweigh flood risk, whilst recognising that detailed evidence will not always be available until the planning application / detailed flood risk assessment stage.

Also, in respect of flood risk, there is a need to look beyond the matter of sites intersecting fluvial flood risk zones to also consider: A) sites intersecting with **surface water flood risk** zones, albeit recognising that surface water flood risk can often be affectively addressed through sustainable drainage systems (SuDS); and B) the risk of development within a given catchment acting in-combination / cumulatively to **increase surface water runoff** rates and, in turn, flood risk, albeit recognising that it is inherently difficult to draw strong conclusions.

Finally, there is a need to consider spatial opportunities to safeguard land from development that is required, or likely to be required, for flood management, including **flood storage areas** (FSAs). There can also be the possibility of going a step further by supporting growth options that would deliver or fund/facilitate an FSA (e.g. as part of a country park that also delivers biodiversity, access and wider benefits, including jobs).

- **Planning for biodiversity, natural capital and ecosystem services** - planning for biodiversity is a climate change adaptation priority, not only because of climate change-related pressures on biodiversity, but also because planning for biodiversity is a cornerstone of planning for healthy functioning ecosystems and, in turn, ensuring continued (and enhanced) provision of ecosystem services vital to climate change adaptation.

  An increasing focus nationally is on securing **net gains** in biodiversity, and also ecosystem services. Whilst there is a focus on developing tools and metrics for quantifying net gains at the planning application stage, there is also recognition of the need to take a **strategic approach**, including by directing growth to those locations where there is best potential to avoid impacts and deliver targeted enhancements (on and off-site), taking account of local evidence of constraints and opportunities. In the Surrey context, such evidence includes work to define and characterise Biodiversity Opportunity Areas (BOAs).

  Finally, a discrete matter is the need to avoid loss of 'best and most versatile' **agricultural land**, recognising that agricultural productivity is an ecosystem service that may increase in importance due to climate change.

- **Water resources and water quality** - climate change is likely to result in major changes to the rainfall regime and, in turn, changes to accessible reserves of water and river / surface-water flows. The primary spatial strategy / site selection related consideration is potentially in respect of directing growth to locations where there is existing **WwTW capacity**, or the potential to deliver timely upgrades. With regards to **water supply**, the WCS finds that there will be adequate water supply to cater for growth over the plan period, under reasonably foreseeable scenarios, hence this matter is of limited relevance to spatial strategy.

- **Other matters** - there are also other means by which spatial strategy and site selection can support adaptation, for example minimising the urban heat island effect, and ensuring that communities have access to high quality green infrastructure. Also, as discussed, spatial strategy and site selection is a key means of supporting a shift to more decentralised heat and power generation, which is an adaptation consideration, in that: a diversified supply will lead to increased resilience to extreme weather events; and a shift from gas boilers to heat pumps (in combination with high fabric/efficiency standards) will reduce waste heat affecting local microclimates.

In respect of **masterplanning and urban design**, key considerations are:

- There is a need to set requirements to ensure that the development conforms to the expectations of the **National Design Guide** in respect of "Resilience", and the **Building for Life** guidance (in particular the criterion: *Does the scheme take advantage of existing topography, landscape features, trees and plants, wildlife habitats, existing buildings, site orientation and microclimate?*).

- Another key recent source of guidance is **Living with Beauty** (2020) which advocates giving early consideration, through Local Plans, to the potential for any given development area/site to achieve place-making objectives (which can and should incorporate climate change adaptation objectives), rather than relying on decisions at the planning application stage. A fundamental consideration is invariably in respect of balancing the objective of maximising development densities in those locations that are well-connected and more broadly suitable for development, with the competing objective of ensuring sufficient space for other uses including greenspace. Taller buildings can be a solution, but can give rise to their own issues, e.g. in terms of solar gain.

In respect of **development management policy**, as a truly cross-cutting issue it is challenging to set policy for climate change adaptation; however, key policy matters with links to adaptation include:

- **Water efficiency** – the entire central-southern part of England is classed as water stressed, and this situation is set to worsen significantly due to climate change, with an increasing reliance on major infrastructure to store and transport water from parts of the country that are not water stressed. National guidance is clear that, whilst Local Plans can require standards of water efficiency that exceed the requirement of Building Regulations (125 litres per person per day), there is only the potential to require 110 litres per day per person. It can also be appropriate to specify how efficiency standards should be achieved (e.g. greywater recycling); however, on the other hand, there is a need to avoid constraining innovation on the part of developers.

- **SuDS** - are a national requirement for major development, but there is the potential to elaborate through Local Plan policy on the types of development that require SuDS and also guide the approach to SuDS locally. SuDS strategy is a focus of the Surrey Heath SFRA (2019).
- Other relevant matters often covered through DM policy include:
  - **Building layout, orientation and design** – for example, the Reading Borough Sustainable Design and Construction SPD (2019) gives detailed guidance in respect of: solar gain, ventilation, thermal mass, insulation, green roofs and living walls, which can all help with avoiding over-heating. There are clear cross-overs here with policy requirements in respect of thermal efficiency / high building fabric standards aimed at minimising need for heating and cooling, with resultant carbon emissions.
  - **Greenspace, landscaping and trees** - it is possible to set policy expectations in respect of quantity and quality of greenspace within development sites, with the London Plan, for example, supporting use of an Urban Greening Factor (UGF). There is also the potential to set policy expectations in respect of trees and landscaping, for example the Reading Borough SPD proposes *"A two pronged approach… Firstly, applicants will be expected to demonstrate how their landscaping plan has taken into consideration the impacts of climate change with regards to their species selection, location of planting and in terms of the management of the landscaping. Secondly, applicants should ensure that trees and landscaping play a role in helping to mitigate the impacts of climate change through integration of planting within SuDS provision…"*
  - **Flexibility of building design** - buildings should be designed from the outset to be flexible to accommodate changing needs including, the need to adapt to higher temperatures. There is a crossover here with the matter of taking a whole life-cycle approach to minimising embodied carbon emissions, as discussed above.
  - **Severe weather** - there is the potential to require severe weather management plans as part of planning applications for major and potentially vulnerable developments.

# Part 3: Overall conclusions

## A need to improve on the baseline scenario: Mitigation

An important starting point is the projected trajectory of decarbonisation in Surrey Heath under a baseline scenario. This assumes that Surrey Heath will see the benefit of national trends, in particular from the decarbonisation of electricity and the electrification of heat and transport, but that Local decision-making, including through the Local Plan, will involve a business-as-usual approach.

The baseline trajectory shows that the Borough is on track to achieve net zero sometime in the second half of the 21st Century, contrary to the national 2050 net zero target. As such, decarbonisation needs to an overarching priority for the Local Plan, and there must be a commitment to monitoring decarbonisation at the Borough-scale over time, and responding accordingly if the trajectory remains off-target.

However, it is a challenge to set a quantifiable decarbonisation target for the Local Plan, to inform either testing of Local Plan options or monitoring and evaluation of the Local Plan's performance over time. This is because the Local Plan is responsible for only a proportion of GHG emissions at the Surrey Heath scale. Whilst work could be undertaken to establish a target decarbonisation trajectory for the Borough as a whole (i.e. a refinement of the red line in Figure A, above), the Local Plan would be just one (albeit very important) 'lever' for achieving the target.

Work might be undertaken to model the decarbonisation impact of Local Plan scenarios; however, work of this nature to inform Local Plans is not currently seen as common practice. For the current Local plan, a more proportionate approach might involve relying on work to explore 'reasonable alternatives', including through the Sustainability Appraisal (SA) process, as a means of demonstrating that Local Plan decisions on preferred options are suitably ambitious, and justified by the evidence, in respect of realising decarbonisation opportunities.

## A need to improve on the baseline scenario: Adaptation

It is not possible to model a trajectory for increasing resilience and adaptation to the anticipated impacts of climate change; however, from the work of the CCC ASC it is clear that the nation is currently not on the required trajectory, and this broad picture applies to Surrey Heath.

It follows that there is a need to place adaptation as a central Local Plan objective, in order to encourage difficult decisions that accelerate the trajectory. It is difficult to say more, in respect of the required level of ambition, including as responsibility does not lie solely with the Local Plan, by any means. However, as per mitigation, it is possible to conclude that the Council should, wherever possible, favour spatial strategy and policy options that are optimal in terms of climate change adaptation, and present reasoned justification where this is not possible.

## Local Plan intervention options

Climate change related intervention options to explore through the Local Plan include:

- Proactively explore spatial strategy options for shaping the Borough in a way that contributes to radical reductions in emissions, in accordance with NPPF paragraphs 148 and 149. Amongst other things, this will mean exploring options that: direct growth to those parts of the Borough where residents would have greatest opportunity to access services, facilities and employment by active and public transport; involve a concentration of growth at one or more strategic growth locations (where economies of scale and a mix of uses can lead to decarbonisation opportunities); and lead to an opportunity to deliver one or more effective heat networks.
- There should be a particular focus on exploring decarbonisation options relating to the regeneration of Camberley town centre, which could be a once in a century opportunity. Equally, the process of developing and testing options should take account of climate change adaptation and resilience objectives, for example in respect of building layout, orientation and design, shading, green infrastructure and sustainable drainage.
- Establish site-specific policy for other key strategic locations to effectively respond to climate change-related issues and opportunities; for example, balancing competing objectives around, on the one hand, wishing to deliver higher densities at accessible locations, and achieve economies of scale in support of low carbon and sustainable infrastructure with, on the other hand, a need to design in space for green and blue infrastructure.
- Understand and communicate ‘win-win’ opportunities; for example, support for high building standards is not only positive from a climate change perspective, but also from a perspective of supporting health and wellbeing, addressing issues of fuel poverty and supporting jobs and economic growth (and any tensions with development viability could reduce rapidly as economies of scale are achieved and a skilled labour force builds).
- Undertake work to better understand the potential to deliver a strategic expansion of walking and cycling infrastructure within the urban area, and potentially borough-wide, working with the County Council.
- Consider whether there are any strategic public transport infrastructure / service upgrades to be realised or facilitated through the Local Plan spatial strategy.
- Give consideration to issues and opportunities associated with the ‘future of mobility’ (particularly within the main urban area), the transition to a whole system smart electricity network and future proofing for hydrogen.
- Work with the County Council to accelerate delivery of a network of EV charging infrastructure, recognising the need for different types of charge point integrated with solar PV and battery storage.
- In addition to broad policy support for LZC power, consider identifying areas of search, or even site allocations, to deliver larger scale solar PV (potentially alongside battery storage and EV charging).
- Set buildings emissions standards as stringently as possible, taking account of Government policy and development viability, and consider a targeted approach, i.e. more stringent where viability allows.
- Set wider sustainable design and construction policy aimed at minimising emissions across the whole-lifecycle of development, and also ensuring resilience to climate change risks, with a focus on detailed requirements suited to effective application at the planning application stage were possible, but balancing this with a need to avoid constraining innovation on the part of developers (suggesting a role for outcome focused policies).
- Take a precautionary (yet proportionate) approach to minimising flood risk, and also a proactive approach that recognises vulnerability and also the potential to support delivery of strategic flood risk attenuation measures;
- Minimise wastewater treatment risks by seeking to direct growth to those locations with existing WwTW capacity, thereby minimising reliance on the need for costly upgrades associated with delivery risk.
- Take a strategic approach to biodiversity and environmental net gain that recognises the climate change-related imperative of maintaining and enhancing wide-ranging ecosystem services, including carbon sequestration.
- Consider appropriate Local Plan monitoring indicators, with associated targets, recognising that Local Plan monitoring can be an appropriate forum for monitoring broad trends, even where they are not directly caused by the Local Plan. Equally, commit to actions should monitoring show that targets are not being achieved.
- Consider an appropriate borough-wide decarbonisation trajectory and net zero target date, and ensure the Local Plan is seen as an integrated element of the wider Council climate change strategy.

# 1 Introduction

1.1.1 AECOM was commissioned in early 2020 to prepare a report aimed at exploring how climate change objectives, both in respect of mitigation and adaptation, might most effectively be addressed through the emerging Surrey Heath Local Plan. More specifically:

- Climate change mitigation - the aim is to understand the likely future trajectory of de-carbonisation within Surrey Heath and then explore Local Plan interventions to increase the speed of decarbonisation and therefore bring forward the date for achieving net zero emissions.
- Climate change adaptation - in a similar fashion, the aim is to understand anticipated climate change impacts and then explore Local Plan interventions to reduce risk and strengthen resilience.

1.1.2 By way of background to the Local Plan, once adopted it will establish a spatial strategy for growth and change for the period up to 2037-40, allocate sites to deliver the strategy and establish the policies against which planning applications will be determined. The Council is currently at the stage of exploring options and is working towards publication of a draft version for consultation.

1.1.3 This study is one of a number of evidence-gathering exercises being undertaken by the Council to inform the Local Plan, several of which will have implications for the achievement of climate change objectives. It is also important to recognise that the Local Plan will emerge over a period of years, over which time the international, national and potentially local policy context, in respect of planning for climate change, will inevitably evolve, potentially at quite a rapid pace. The intention is for this report to provide a foundation on which to progress the Local Plan, rather than to provide all of the answers. There will be a need to gather further evidence and explore issues/options in detail, including through consultation.

## Structure of this report

1.1.4 This report is structured in **two parts** dealing with climate change mitigation and adaptation in turn. Each part is then structured in three sections in order to answer the following **three questions**:

- What is the context?
- What is the baseline scenario?
- What are the intervention options feasibly open to the Council?

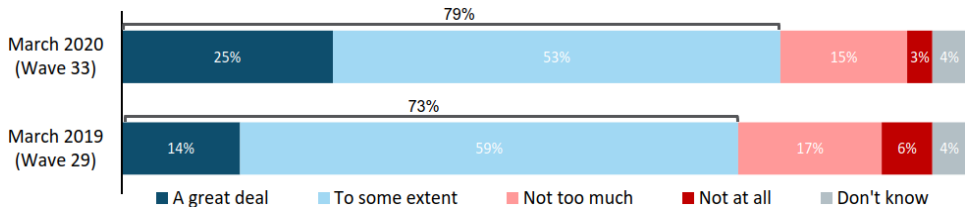
1.1.5 A final part of the report then presents conclusions and recommendations.

## The importance of planning for climate change

1.1.6 There is a raft of legislation, policy, guidance and research, in respect of both climate change mitigation and adaptation, to draw upon when preparing the Surrey Heath Local Plan, as discussed within the context reviews sections below. It is also important to recognise the ground swell of public opinion, as explored through a recent (May 2020) Public Attitudes Tracker:[3]

- In March 2020, 76% of the public said they were either very concerned (35%) or fairly concerned (41%) about climate change (a fall from the peak of 80% observed in March 2019; potentially Covid-19 related).
- Among all people apart from the 2% who did not believe in climate change: 56% thought that climate change is currently affecting people in their local area; 79% thought it was affecting people in the UK (see Figure 1.1); and 86% thought it was affecting people in other countries.

*Figure 1.1: How much climate change is currently affecting people in the UK?*




[3] See gov.uk/government/collections/public-attitudes-tracking-survey

# Part 1: Mitigation

# 2 Introduction

2.1.1 Following a context review, the aim of this part of the report is to understand the likely future trajectory of decarbonisation within Surrey Heath and then explore Local Plan interventions to increase the speed of decarbonisation and therefore bring forward the date for achieving net zero emissions.

2.1.2 This part of the report answers the following questions:

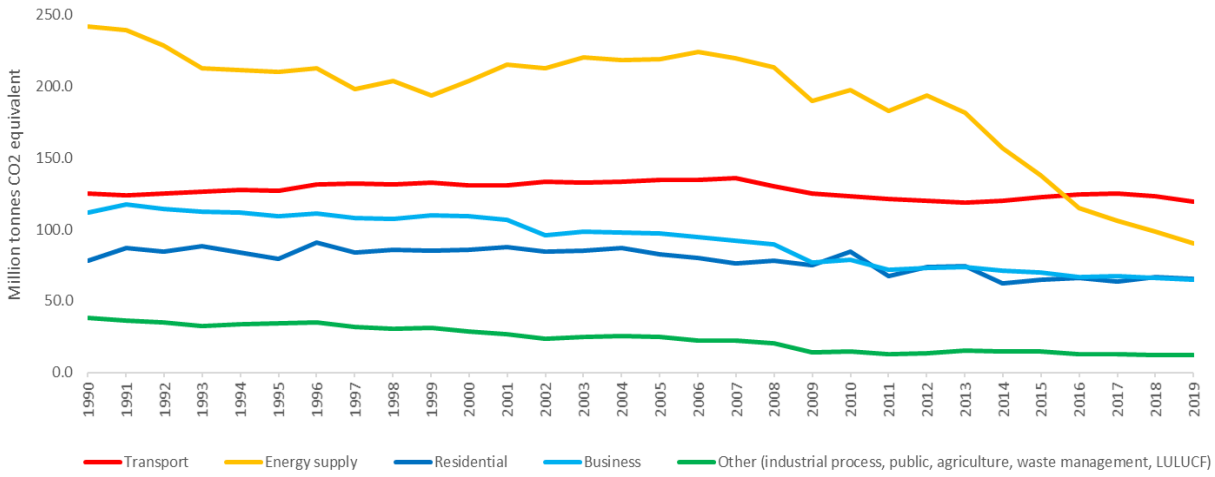
- What is the context?
- What is the baseline scenario?[4]
- What are the intervention options feasibly open to the Council?

# 3 What is the context?

3.1.1 Climate change mitigation is a highly cross-cutting topic, reflecting the breadth of greenhouse gas (GHG) emitting activities – see Figure 3.1 – some of which can be influenced by the Surrey Heath Local Plan.

3.1.2 The following is a brief review of legislation, policy and research in respect of key emissions sectors, with a focus on those of greatest relevance to the Local Plan.

*Figure 3.1: UK annual territorial GHG emissions by source sector, 1990 to 2019 (provisional)*[5]




## 3.2 Climate legislation and targets

3.2.1 There is a need to explain the evolution of legislation and legal precedent from 2008 to 2020.

### Climate Change Act (2008)

3.2.2 The Climate Change Act 2008 set a "carbon target" for the United Kingdom to reduce its greenhouse gas emissions by **80%** from their level in 1990 by 2050. This was consistent with the global temperature limit in place in 2008, which was **2°C**.

### Paris Agreement (2015)

3.2.3 In contrast to the Climate Change Act, the Paris Agreement (2015), which was adopted by participating member states of the 21st Conference of the Parties (COP) of the United Nations Framework Convention on Climate Change, enshrines a commitment to restricting the increase in the global average temperature to *"well below 2°C above preindustrial levels and pursuing efforts to limit… to **1.5°C**…"* (article 2(1)(a)).

[4] The baseline scenario describes a future state in which only policies already 'in the pipeline' are implemented.
[5] data.gov.uk/dataset/9a1e58e5-d1b6-457d-a414-335ca546d52c/provisional-uk-greenhouse-gas-emissions-national-statistics

3.2.4 The agreement also establishes an aspiration to achieve **net zero** greenhouse gas emissions during the second half of the 21st century – a *"balance between anthropogenic emissions by sources and removals by sinks of greenhouse gases in the second half of this century"* (article 4(1)).

3.2.5 Looking ahead, Glasgow will host COP26, with a Government Minister appointed to oversee the conference, and the UK Government calling for a preceding "year of climate action".[6]

### Amendment to the Climate Change Act (2019)

3.2.6 The Paris Agreement requires each state to determine its own contribution to a global net zero target, hence in 2019 an amendment was made to the Climate Change Act 2008 ("2050 Target Amendment") to introduce a **net zero target**. This legislation broadly[7] put into effect a recommendation of the Committee on Climate Change (the statutory body set up to monitor and advise on progress towards the targets).

### Heathrow Judgement (2020)

3.2.7 Recent context also comes in the form of the Court of Appeal Judgement *R (Friends of The Earth) V Secretary Of State For Transport And Others* in respect of expansion of capacity at Heathrow Airport by the addition of a third runway under the policy set out in the Airports National Policy Statement (ANPS). The Court identified a fatal flaw in the process of preparing the ANPS, stating:

*"This relates to the legislative provisions concerning the Government's policy and commitments on climate change, in particular the provision in section 5(8) of the **Planning Act**, which requires that the reasons for the policy set out in the ANPS "must … include an explanation of how the policy… takes account of Government policy relating to… climate change". We have concluded, in particular, that the designation of the ANPS was unlawful by reason of a failure to take into account the Government's commitment to the provisions of the **Paris Agreement** on climate change..."*

3.2.8 The requirement of the Planning Act referenced by the Court does not apply to Local Plans; however, there are lessons to learn, nonetheless. Specifically, the judgement serves to indicate the importance of *explicitly* taking account of climate change commitments on the basis of an up-to-date understanding of everything that is "evidently material".

## 3.3 Surrey Heath Climate Emergency

3.3.1 Surrey Heath BC **declared a Climate Emergency on 9th October 2019** and, at the same meeting, the Full Council also resolved to:

- acknowledge that 'business as usual' is not an option in the face of the climate and biodiversity emergency that is happening globally, and that society in its current form is unsustainable;
- make Surrey Heath Borough Council and its contractors carbon neutral by 2030, or earlier if possible, taking into account both production and consumption emissions; and
- assess and adjust the Council's current activities both in terms of their scope and how they are undertaken, and include the impact of recommendations on $CO_2$ emissions in all officer reports.

3.3.2 The key point to note is that the 2030 commitment relates to **the Council as an organisation**, as opposed to Surrey Heath as a geographic area. This approach is common amongst local authorities nationally and locally (for example Guildford Borough and Woking Borough), although a number of authorities are going further. A review of the 274 local authorities that have declared a climate emergency highlights ambitious approaches including (with a focus on authorities more relevant to the Surrey Heath context):[8]

- Winchester District council – "Commit to the aim of making the activities of Winchester City Council carbon neutral by 2024, and the district of Winchester carbon neutral by 2030."
- Warwick District Council – commit to becoming "a net-zero carbon organisation… by 2025… [and] Facilitating decarbonisation by local businesses, other organisations and residents so that total carbon emissions within Warwick District are as close to zero as possible by 2030."

[6] See ukcop26.org/yoca/
[7] It retains the ability to use international carbon credits.
[8] See climateemergency.uk/blog/list-of-councils/

- Basingstoke and Deane Borough – "The council agreed in September 2019 action must be taken to work towards making Basingstoke and Deane a carbon neutral borough by 2030. And we're leading by example by setting ourselves a target to deliver services to our residents in a more environmentally-friendly way and become carbon neutral by 2025."

3.3.3 A number of city and urban Councils are also committing to achieving carbon neutrality earlier, although it is important to recognise that opportunities present themselves in urban areas over-and-above those that present themselves in areas such as Surrey Heath. Notably:

- Nottingham - has led the way nationally over recent years, having reduced citywide $CO_2$ emissions by 41% (49% reduction in per capita emissions) between 2005 and 2020, and has now published a detailed strategy to enable it to become a zero carbon city by 2028.
- Reading – has committed to becoming carbon neutral by 2030, and recently committed to a range of major capital projects costing a total of £34m, including:[9] £18 million for the new Green Park Station; £11 million for the South Reading Mass Rapid Transit; and £4.5m for renewable energy.

3.3.4 It is also important to note here that understanding of the 'net zero' concept is relatively low at the current time, but could be set to increase. The recent Public Attitudes Tracker (May 2020),[3] discussed above, found that the proportion of people who had any awareness of "net zero" was 35%.

## 3.4 Planning legislation and policy

3.4.1 Climate change is referenced within the Planning and Compulsory Purchase Act 2004 and is a focus of the National Planning Policy Framework (2019).

### Planning and Compulsory Purchase Act

*3.4.2* The PCPA (2004), which governs the preparation of Local Plans, requires that the Local Plan, taken as a whole, includes *"policies designed to secure that the development and use of land in the local planning authority's area* ***contribute to*** *the mitigation of, and adaptation to, climate change."*

### Nationally Planning Policy Framework

3.4.3 Paragraphs 148 and 149 of the NPPF (2019) provide an overview of Government policy objectives for Local Plans, and require that Local Plans *"****contribute to radical reductions*** *in greenhouse gas emissions"* (also *"minimise vulnerability and improve resilience"*) with footnote 48 clarifying the need to be *"in-line with the objectives and provisions of the Climate Change Act 2008."*

*3.4.4* Further detail is then presented across paragraph 150, which deals with the "location, orientation and design" of buildings, and paragraph 151, which deals with planning to *"increase the use and supply of renewable and low carbon energy and heat"*, stating that Local Plans should:

- provide a positive strategy for energy from these sources;
- consider identifying suitable areas for renewable and low carbon energy sources; and
- identify opportunities for development to draw its energy supply from decentralised, renewable or low carbon energy supply systems and for co-locating potential heat customers and suppliers.

## 3.5 CCC Net Zero Report

3.5.1 In 2019 the Committee on Climate Change (CCC) published a major report that proposed a national net zero target be set in light of the Paris Agreement (the recommended target was broadly taken-up by Government, as discussed above) and actions required nationally in order to achieve the target.[10]

3.5.2 The following bullet points cover the key categories of intervention:

[9] See news.reading.gov.uk/34m-for-net-zero-carbon-reading/
[10] See theccc.org.uk/publication/net-zero-the-uks-contribution-to-stopping-global-warming/

- **Heating buildings** - the CCC concluded: "An overhaul of the approach to low-carbon heating and energy efficiency is needed. The Government's planned 2020 Heat Roadmap must establish a new approach..."
- **Electric vehicles** (EVs) - the CCC concluded: "By 2035 at the latest all new cars and vans should be electric (or use a low-carbon alternative such as hydrogen). If possible, an earlier switchover (e.g. 2030) would be desirable, reducing costs for motorists and improving air quality. This could help position the UK to take advantage of shifts in global markets. The Government must continue to support strengthening of the charging infrastructure, including for drivers without access to off-street parking."
- **Power** - the Net Zero report explained that: *"The Energy White Paper planned for 2019 should aim to support a quadrupling of low-carbon power generation by 2050";* and there is also a need to support flexibility via interventions focused on demand, storage and interconnection.
- **Waste** - bio-degradable waste streams should not be sent to landfill after 2025. This will require actions through the waste chain, including for example mandatory separation of waste.
- **Agriculture** - policy to encourage farming practices that reduce emissions must move beyond the existing voluntary approach, with subsidy linked to actions to reduce and sequester emissions.
- **Carbon capture and storage (CCS)** - is a set of technologies which can together capture carbon dioxide from waste gases, and either 'lock up' this $CO_2$ in long-term storage or use it in industrial processes. The Net Zero report discusses the need for at least two industry clusters with CCS operating by 2030, at least one of which should involve substantial production of low-carbon hydrogen; however, the choice is between the top six heavy industry clusters, e.g. the largest at Humberside.
- **Wider policy interventions** - the CCC report describes the need to set policy to guide *"industry, land use, HGVs, aviation and shipping, and GHG removals"*.

3.5.3 The report also identifies the need to overcome obstacles in respect of:

- **Policy-making** - "The net-zero challenge must be embedded and integrated across all departments, at all levels of Government and in all major decisions that impact on emissions… Since many of the solutions cut across systems (e.g. hydrogen has a role in electricity generation, transportation, industry and heating), fully integrated policy, regulatory design and implementation is crucial…"
- **Business actions** - "Some previous policies have delivered the desired business response in full (e.g. the banning of inefficient gas boilers in the 2005/06 Building Regulations, the offering of long-term contracts to offshore wind farms). Others, like the Green Deal and vehicle emissions standards, have not… Crucially, there should be a stable and long-term approach."
- **Public actions** - "Much of the success so far in reducing emissions… has happened with minimal change or awareness needed from the public. However, this cannot continue…"
- **Infrastructure** - "Reaching net-zero emissions will require development or enhancement of shared infrastructure such as electricity networks, hydrogen production and distribution and $CO_2$ transport and storage… Regional coordination will be required, including for transport where powers are devolved."
- **Skills** - for example, new skills support for designers, builders and installers is urgently needed for low-carbon heating (especially heat pumps), ventilation and property-level flood resilience.
- **Ensuring a just transition** - there is a need to consider how the transition will be funded and where the costs will fall.

## CCC letter on the Covid-19 recovery

*3.5.4* On 6th May 2020 the CCC wrote to the Prime Minister explaining that:[11]

*"As the Government considers its approach to rebuilding after the COVID-19 crisis we are writing to advise on how climate policy can play a core part. Actions towards net-zero emissions and to limit the damages from climate change will help rebuild the UK with a stronger economy and increased resilience."*

[11] See theccc.org.uk/publication/letter-building-a-resilient-recovery-from-the-covid-19-crisis-to-prime-minister-boris-johnson/

3.5.5 The letter suggests that there is *"a new context for climate policy"*, including because the crisis *"has emphasised the importance of preparing for systemic risks"*. The letter describes a need to consider the inter-relationship between the Covid-19 response and climate change policy over the short, medium and long-term. In the short term, the public health response will have various implications for climate change policy, but it is clear that the "common experience" of lockdown will lead to climate action opportunities. Over the medium to long-term -

- Economic recovery and potential restructuring will have implications for climate policy – there is the potential to use climate investments to support economic recovery and jobs;
- The lasting nature of short-term behavioural changes is currently uncertain, but the Government can lead the way to new social norms that benefit wellbeing, improve productivity and reduce emissions;
- There will be a need to embed fairness as a core principle - the benefits of acting on climate change must be shared widely, and the costs must not burden those who are most vulnerable.

3.5.6 Specific priorities include:

- Housing retrofits and building new homes that are fit for the future – "Where the skills to deliver these measures already exist, these projects can begin now, are labour-intensive, and have direct social benefits of more comfortable homes leading to improved well-being and health."
- Electricity networks – "must be significantly strengthened across the UK to accommodate electrification of heat and transport… Post-COVID-19 economic recovery presents an opportunity for governments, regulators and the industry to work together to accelerate these investments."
- Tree planting, peatland restoration and green infrastructure – "The importance of urban greenspace to people has been highlighted... Restoring parks, urban tree planting, and supporting the green roof and sustainable drainage industries can help to bolster the UK's slow-growing adaptation services sector."
- Making it easy for people to walk, cycle, and work remotely – "Restrictions on movement during this crisis and the potential for longer-lasting social distancing and home-working measures could mean a radically different context for transport policy."

3.5.7 It is also important to note that there have been wide-spread calls for the Government to take steps to ensure a 'green' economic recovery, following-on from the following statement made by the Prime Minister in April 2020:[12] *"Nations will begin to emerge from lockdown and look to fire up their economies once again. When that happens it will be the duty of every responsible government to… rebuild in a way that will stand the test of time. That means investing in industries and infrastructure that can turn the tide on climate change. And it means doing all we can to boost resilience by shaping economies that can withstand everything nature throws at us."*

*3.5.8* For example, in June 2020 more than 200 prominent companies, including AECOM, wrote to the Prime Minister calling for a clean, inclusive and resilient recovery from coronavirus. This is also a focus internationally, for example the European Union has proposed *"the biggest green stimulus package in history"*, with a view to putting climate change at the centre of economic recovery,[13] with the deputy Prime Minister of Spain suggesting: *"The recovery should be green or it will not be a recovery, it will just be a short-cut into the kind of problems we are facing right now."*[14]

3.5.9 The following statement made by the Royal Town Planning Institute (RTPI), in April 2020, is also of note:[15]

*"The current situation makes it all the more important to support better planning, and avoid the risk and inefficiency of deregulation, uncoordinated investment… and uncontrolled development… The lockdown period has demonstrated the importance of high quality housing, resilient infrastructure, local services and green space, along with the inequalities that people face when accessing these. The crisis has also presented opportunities to learn from temporary improvements to air quality and biodiversity, different ways of working, and new models for cooperation on other shared challenges such as climate change."*

[12] See greenpeace.org.uk/resources/green-recovery-manifesto/
[13] See bbc.co.uk/news/science-environment-52848184?intlink_from_url=https://www.bbc.co.uk/news/topics/cmj34zmwm1zt/climate-change&link_location=live-reporting-story
[14] See ukgbc.org/news/property-and-construction-firms-lead-call-for-resilient-recovery-in-letter-to-pm/
[15] See rtpi.org.uk/policy/2020/april/priorities-for-planning-reform-in-england/

3.5.10 Also, the RTPI recently (July 2020) published *Plan the World we Need*, which begins with the following statement*: "To recover from Covid-19, we need to make plans. These must be holistic in nature, integrated in structure, and resourced for delivery. They need to accelerate progress to a zero carbon economy, increase resilience to risk, and create fair, healthy and prosperous communities."*[16] This report built on another RTPI report from earlier in 2020, titled *Five Reasons for Climate Justice in Spatial Planning*.

3.5.11 Most recently, the UK Climate Assembly (September 2020)[17] found that 79% of assembly members 'strongly agreed' or 'agreed' that *"steps taken by the government to help the economy recover should be designed to help achieve net zero"*; and 93% equally supported: *"As lockdown eases, government… should take steps to encourage lifestyles to change to be more compatible with reaching net zero"*.

# 3.6 Guidance for Local Plans

## Planning practice guidance

3.6.1 Whilst the PPG on climate change mostly dates from 2014,[18] it does set out a range of helpful principles to guide Local Plan-making, including under the heading: 'How can the challenges of climate change be addressed through the Local Plan?'. These principles are returned to below.

3.6.2 A second key section of the PPG is on 'Renewable and low carbon energy'.[19] The sub-section on 'Developing a strategy for renewable and low carbon energy' includes a range of points that are returned to below, although again it is important to note that the section has mostly not been updated since 2014.

3.6.3 The most significant sub-section is that which deals with planning for **onshore wind**, which repeats the tests introduced in 2015, stating that local planning authorities should grant planning permission only if a proposed wind turbine is in an area identified as suitable for wind energy development in a local or neighbourhood plan, and if it can demonstrated that the proposal is supported by the local community. The latter criterion has had a major impact on delivery of new onshore wind over recent years; however, a recent (February 2020)[20] Government consultation document proposes a commitment to supporting the cheapest forms of low-carbon electricity generation; onshore wind and solar energy.

## RTPI / TCPA guidance for Local Plans

3.6.4 Prepared by the RTPI and the Town and Country Planning Association (TCPA), section 4 of the guidance (2018) deals with Local Plans, notably covering:[21]

- **Renewable and low-carbon energy and associated infrastructure** – amongst other things, the guidance advocates identifying sensitive areas for deployment of different renewable technologies and supporting opportunities for community-led renewable and low-carbon energy developments.
- **Decentralised energy and district heat networks** – the guidance recommends setting requirements that: "relate to identified development areas or specific sites… and focus on opportunities at a scale that developers would not be able to realise on their own…"
- **Setting requirements for sustainable buildings** – the guidance explains that *"local planning authorities still have some flexibility with respect to housing standards"* and supports established standards including those developed by the Building Research Establishment (BRE) and Passivhaus.
- **Supporting sustainable transport** – amongst other things, the guidance explains that: "Sustainable transport needs to be considered in an integrated manner at the beginning of the plan-making process, so that development patterns are shaped by existing and planned sustainable transport infrastructure..."

3.6.5 More recently the RTPI has published two reports ("Priorities for Planning Reform" and "Planning the World we Need") calling for climate change mitigation to be central to the national recovery from the Covid-19 pandemic and national lockdown, as discussed above.[22]

[16] See rtpi.org.uk/news/plan-the-world-we-need/
[17] See https://www.climateassembly.uk/
[18] See gov.uk/guidance/climate-change
[19] See gov.uk/guidance/renewable-and-low-carbon-energy
[20] See theccc.org.uk/2020/03/03/ccc-welcomes-government-re-commitment-to-onshore-wind-and-solar/
[21] See tcpa.org.uk/planning-for-climate-change
[22] See rtpi.org.uk/new-from-the-rtpi/?contentType=Policy

### FOE's Climate Action Plan for Councils

3.6.6 In addition to the RTPI and TCPA, Friends of the Earth (FoE) is another national organisation with an active interest in planning for climate change mitigation through Local Plans. FOE's Climate Action Plan for Councils (2020) presents a list of 50 actions, although a number are more relevant to SHBC's corporate policy and wider functions, than the Local Plan:[23]

- Putting our climate at the heart of **decision-making** – six actions to ensure that "our climate and nature restoration goals are front and centre in all decision-making and investments..."
- **Raising money** – four actions including: "Use legal and planning mechanisms such as Section 106 agreements, Community Infrastructure Levy… to fund climate actions and nature restoration projects."
- **Protect the most vulnerable** – two actions to "ensure that those most vulnerable to the effects of climate change are properly supported and protected."
- **Buildings** – seven actions to "ensure all homes are well insulated to minimum EPC C level and eradicate fuel poverty as fast as possible, and make a proportional contribution to the 1 million eco-heating heat pumps that need to be fitted in the UK each year."[24] Key actions relevant to Local Plans include requiring higher standards than current national standards for new homes, including requiring heat pumps.
- **Transport** – eight actions including: "Reduce the need to own and use a car through managing the location and design of new developments in the local plan and improving provision of cycling, walking and public transport."
- **Power** – seven actions including: "Significantly grow renewable energy generation through identifying areas suitable for generation in the Local Plan".
- **Waste** – seven actions to ensure that the local authority becomes "a sustainable consumption and zero waste area where all waste is minimised, recycled or reused as part of a circular economy approach."
- **Land use** – five actions to "restore nature to help drawdown carbon pollution from the atmosphere and to ensure everyone has access to nature in nearby green spaces."

## 3.7 Decarbonising transport

3.7.1 Government published Decarbonising Transport in March 2020,[25] ahead of a full Transport Decarbonisation Plan timetabled for autumn 2020. The report begins by setting out the **scale of the challenge** (see Figures 3.2 to 3.4). Key points to note from the figures include:

- Transport overtook power supply as the primary source of emissions nationally about four years ago;
- Department for Transport (DfT) projections show the transport emissions will decrease significantly;
- However, the rate of decrease falls well short of what is required to achieve net zero targets;
- Passenger car emissions dominate but are decreasing, whilst van / HGVs emissions are increasing.

3.7.2 The Government identifies **strategic priorities** including:

- Accelerate modal shift to public and active transport;
- Support EVs including by delivering charging infrastructure and supporting energy system readiness;
- Deliveries – "A huge opportunity exists to transform 'last mile' deliveries…"
- Place-based solutions - "Consider where, how and why emissions occur in specific locations; Acknowledge a single solution will not be appropriate for every location..."

3.7.3 The report also discusses links to the forthcoming DfT Science Plan, which will explore matters including EV battery technology development; EV charging infrastructure; and the role of hydrogen as a future low carbon fuel, noting that electric batteries are not likely to be a solution for powering larger road, marine and rail vehicles.

[23] See takeclimateaction.uk/climate-action/get-your-council-adopt-climate-action-plan
[24] Energy Performance Certificates are a legal requirement under the Energy Performance of Buildings (England and Wales) Regulations 2012. They are a requirement separate to those that must be met under Building Regulations.
[25] gov.uk/government/publications/creating-the-transport-decarbonisation-plan

3.7.4 Decarbonising Transport (2020) builds upon other recent strategies including **Road to Zero** (2018), which listed 46 actions, of which 44 were intended to shift the vehicle fleet to ultra-low emission vehicles and electric vehicles.[26] Following Road to Zero:

- The CCC identified a transport policy gap of 14 $MtCO_2e$ for which there are no policies and a further 42 MtCO2e for policies that are either not firm or at risk of delivery, in particular in respect of reducing demand for travel and supporting modal shift to public transport and active modes of transport.[27]
- Centre for Research into Energy Demand Solutions (CREDS) suggested that "aims for a reduction in $CO_2$ emission from transport emissions by technology, without changing demand, do not appear to be based on a realistic assessment of what is practically possible." CREDS pointed to recent evidence highlighting that distance travelled by private car by younger age groups has reduced significantly over recent years, particularly within urban areas, which serves to highlight the need to caution against projecting forward current demand for private car travel.[28]
- Friends of the Earth stated that: "Even if all new cars and vans are zero-emission by 2030, which will reduce emissions significantly, it will still be necessary to reduce miles driven. The scale of traffic reduction required may be in the order of 20-60% by 2030, depending upon… other policy…"[29]

3.7.5 Finally, in respect of decarbonisation transport, it is important to note that the Government is consulting on bringing forward the end to the sale of new petrol, diesel and hybrid cars and vans from 2040 to 2035.[30]

*Figure 3.2: The gap between projected transport emissions and targets*

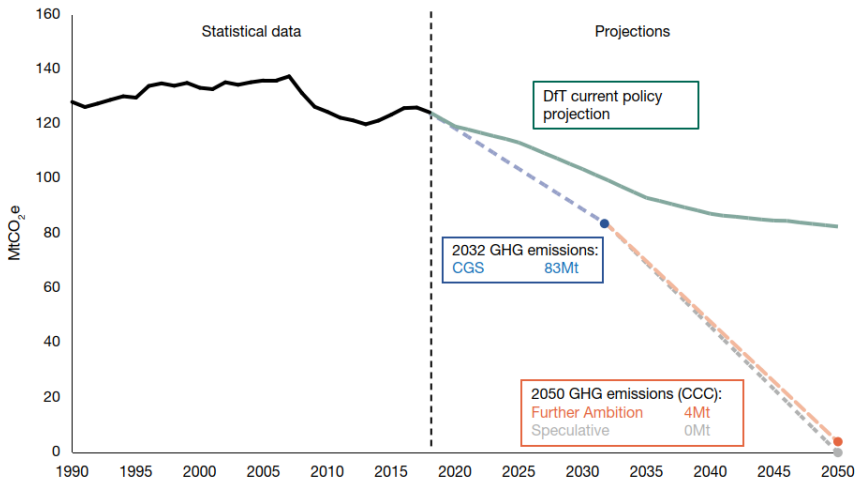
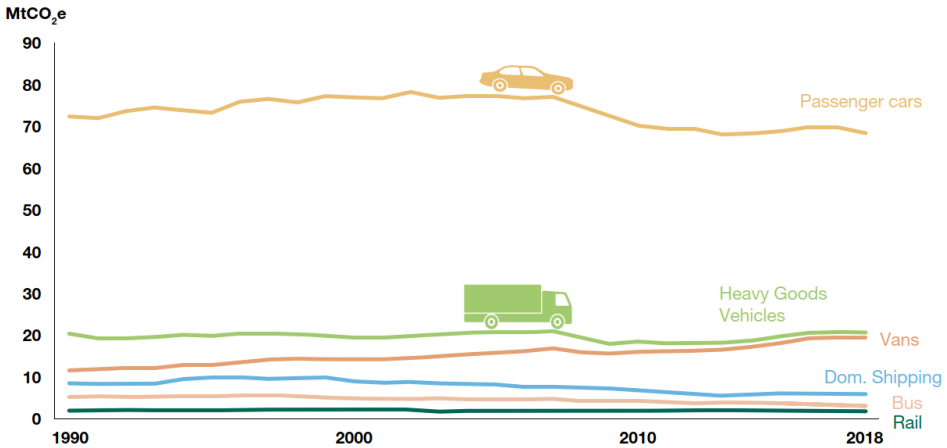
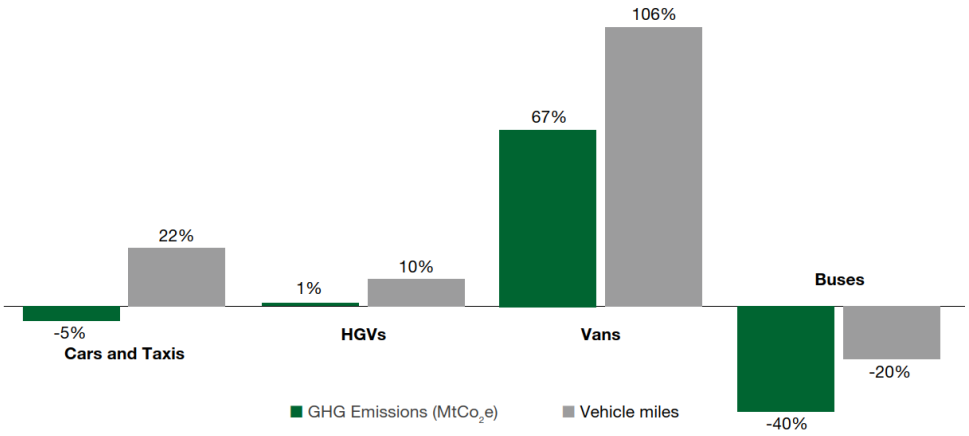



*Figure 3.3: UK transport GHG emissions from selected sources1990 to 2018*




[26] See gov.uk/government/publications/reducing-emissions-from-road-transport-road-to-zero-strategy
[27] See theccc.org.uk/publication/letter-to-chris-grayling-and-greg-clark-assessment-of-the-road-to-zero-strategy/lord-deben-to-chris-grayling-greg-clark-on-road-to-zero/.
[28] See creds.ac.uk/clean-growth-strategy/
[29] See policy.friendsoftheearth.uk/insight/more-electric-cars
[30] See gov.uk/government/consultations/consulting-on-ending-the-sale-of-new-petrol-diesel-and-hybrid-cars-and-vans

*Figure 3.4: Change in GHG emissions and vehicle miles, 1990-2018*




### A note on Hydrogen-Fuelled Vehicles

3.7.6 Currently in the UK, there are hydrogen-fuelled vehicles being used in the London bus fleet (ten in total) and in Aberdeen (six)[31]. However, there are many more planned across the country. Hydrogen has inherent advantages over electric power in respect of powering heavy vehicles, including trains, busses and HGVs; however, it remains to be seen whether a hydrogen vehicle market will compete fully with the EV market. There remain only a small handful of hydrogen refilling stations in the UK,[32] and a very significant expansion of this infrastructure would be needed to support a hydrogen vehicle market.

## Implications of Covid-19 lockdown

3.7.7 The world's daily $CO_2$ emissions fell by 17% in April 2020 when compared to 2019 levels, according to a study published in May 2020, with the great majority of these decreases due to reduced car travel.[33]

3.7.8 A recent (May 2020) survey found that 20% of drivers will use their cars less following lockdown, with 11% expecting to work from home more often (23% amongst those aged 35-44).[34] Also, 40% of survey respondents (62% of 18-24 year-olds) stated that they will do more outdoor activities following the end of lockdown, which may translate to a modal shift away from the private car.

3.7.9 Expected decreased car use may be partly due to concerns in respect of air quality, with research findings anticipated on links between Covid-19 outcomes/mortality and poor air quality, as well as the wider public health benefits of improved air quality over the lockdown period. Some research findings have already been published, for example the Centre for Research on Energy and Clean Air estimates that, in April 2020, air quality improvements in the UK and Europe resulted in 11,000 fewer deaths from pollution.[35]

3.7.10 Reasons for shifts in transport behaviours will be wide-ranging. Greenpeace has suggested: *"The UK's lockdown has given us cause to reflect on the impact of transport on our quality of life and the potential to reimagine a transport system that works for people's health, wellbeing, the economy and the climate. Nitrogen dioxide air pollution levels have dropped… Calmer, less congested roads have created more space for walking and cycling, giving a flavour of what a redesigned transport network might look like."*[36]

3.7.11 The likely shift in transport behaviours is recognised by the UK Government who, in May 2020, announced an active travel fund as the first stage of a £2 billion investment,[37] as well as emergency legislation and guidance for local authorities on re-allocating road space for active travel.[38] The guidance explains: *"Authorities should monitor and evaluate any temporary measures they install, with a view to making them permanent, and embedding a long-term shift to active travel as we move from restart to recovery."*

[31] https://fuelcellbuses.eu/
[32] drivingelectric.com/your-questions-answered/1363/where-can-i-buy-hydrogen-and-where-my-nearest-hydrogen-filling-station
[33] See axios.com/carbon-emissions-coronavirus-lockdowns-5924a570-e3c1-4c1e-a721-1f63f2d3525e.html
[34] See airqualitynews.com/2020/04/29/20-of-motorists-will-use-car-less-after-lockdown/
[35] See energyandcleanair.org/air-pollution-deaths-avoided-in-europe-as-coal-oil-plummet/
[36] See greenpeace.org.uk/resources/green-recovery-manifesto/
[37] See gov.uk/government/news/2-billion-package-to-create-new-era-for-cycling-and-walking
[38] See gov.uk/government/publications/reallocating-road-space-in-response-to-covid-19-statutory-guidance-for-local-authorities/traffic-management-act-2004-network-management-in-response-to-covid-19

3.7.12 Announcing the new guidance, the UK Transport secretary Grant Shapps stated:

*"We recognise this moment for what it is: a once in a generation opportunity to deliver a lasting transformative change in how we make short journeys in our towns and cities."*

3.7.13 However, not all implications will be positive, from a transport perspective, with 20% of survey respondents suggesting that they might use public transport less, and there may be a desire to use the car for social distancing reasons. Also, other lifestyle changes, e.g.40% of respondents will see more of their family, may lead to implications for transport patterns.

## 3.8 The Future Homes Standard

3.8.1 Government's Future Homes Standard (FHS) consultation document (2019)[39] proposes tightening the GHG emissions element of the Building Regulations (Part L) to the point where a 75-80% reduction on current requirements is achieved by 2025. The FHS bears a resemblance to the Zero Carbon Homes standard, which was announced in 2006 but revoked in 2016.[40]

3.8.2 The proposal is to require either a reduction of 20% through fabric standards / energy efficiency alone or, the Government's preferred choice, require a 30% reduction through both fabric and low carbon heat and/or power generation. There is a focus on heat pumps and heat networks, which "*should typically be used to deliver the low carbon heating requirement…"*, with briefer mentions of support for solar PV.

*3.8.3* The FHS consultation document also notably proposes that Building Regulations should be adjusted in 2020 to reflect "*a meaningful but achievable… steppingstone"*; and removing "***the ability of local planning authorities to set higher energy efficiency standards****… [to avoid] inefficiencies in supply chains, labour and potentially… outcomes."* This latter point has major implications for Local Plans, noting that a focus of recent guidance for Local Plans (see above) has been in respect of setting local standards.

3.8.4 A further consultation is anticipated in 2020 on non-domestic buildings and retrofitting.

## 3.9 Decarbonising heating

3.9.1 The 2019 Spring Statement announced *"the end of fossil fuel heating systems in new homes from 2025"*,[41] reflecting a report by the CCC finding that the UK has made almost no progress on decarbonising heating.

3.9.2 The growing consensus is that the only clear route to decarbonising heating is via the electrification of heating and the most efficient way to use electricity for heating is to use **heat pumps**, whether that be: stand-alone household heat pumps using ambient heat from the air ('air source') or the ground ('ground source'); or heat pumps as part of a district heating system / **heat network** (henceforth heat network).[42] Networks souring heat from **combined heat and power** (CHP) also have a role; however, this is rapidly decreasing role as the national electricity grid decarbonises, to the benefit of electric options (heat pumps).

3.9.3 There is also a need to give brief consideration to use of **hydrogen** and **biogas**.

### Heat pumps (as part of a heat network)[43]

3.9.4 The Spring Statement followed UK Housing: Fit for the future (2019), which found that: *"The evidence now indicates that low-carbon heat, and heat pumps specifically, are expected to deliver cost-effective carbon savings in all new build homes by 2025 or earlier".*[44] For the purposes of this context review it is appropriate to focus on the matter of delivering heat pumps as part of a **heat network**, as opposed to stand-alone household heat pumps. This is because heat networks require strategic planning, and hence are highly relevant to the Local Plan. The following is a definition of a heat network:[45]

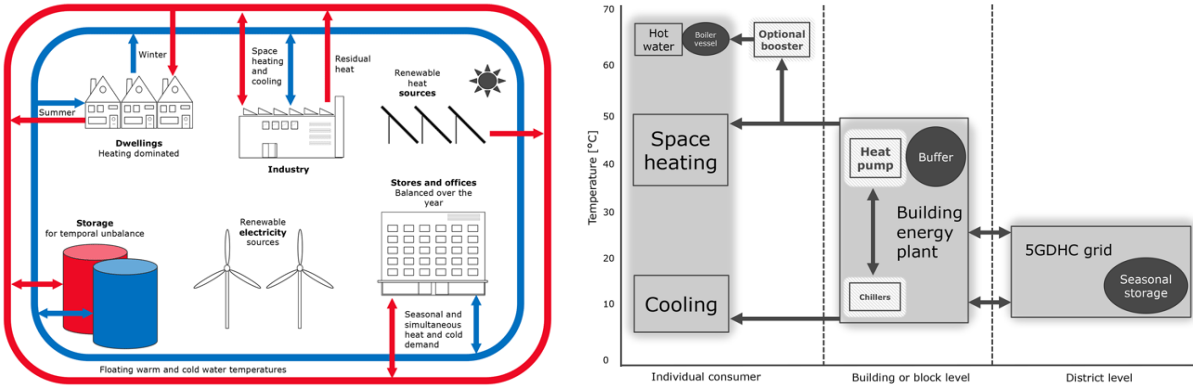
[39] See gov.uk/government/consultations/the-future-homes-standard-changes-to-part-l-and-part-f-of-the-building-regulations-for-new-dwellings
[40] See solarpowerportal.co.uk/news/future_homes_standard_does_not_go_far_enough_ccc_warns
[41] See gov.uk/government/groups/heat-in-buildings
[42] See gov.uk/guidance/heat-networks-overview
[43] A heat pump as a device for cooling or warming an enclosed space by removing heat from interior air and transferring it out (as per a refrigerator or air conditioner), or by absorbing heat from outdoor air, or from a hot-water source, and transferring it in.
[44] See theccc.org.uk/publication/uk-housing-fit-for-the-future/
[45] See gov.uk/government/publications/what-is-a-heat-network

*"Heat networks (also known as district heating) supply heat from a central source to consumers, via a network of underground pipes carrying hot water. Heat networks can cover a large area or even an entire city, or be fairly local supplying a small cluster of buildings… There are many possible technologies that can provide the input to a heat network including… **heat pumps**…"*

3.9.5 The FHS consultation document also explains that heat networks *"provide a unique opportunity to exploit larger scale, renewable and recovered heat sources that can't be accessed at an individual building level. Heat networks also provide system benefits such as thermal storage [contributing to grid balancing]."*

3.9.6 The emerging consensus is that **fifth generation heat networks** are at the cutting edge of practice, which meet (in whole or in part) both the heating and cooling demands of buildings by means of distributed heat pumps installed at customer substations (see Figure 3.5a). The key defining feature of fifth generation schemes is the use of a low temperature heat source, with temperature raised as close to the point of demand as possible (see Figure 3.5b). Low temperature heat can be derived from a wide range of sources.[46] Further definition is presented in the recent LETI Climate Emergency Design Guidance.[47]

*Figure 3.5: Graphical explanations of fifth generation heat networks from Boesten et al. (2019)[48]*




3.9.7 The UK is at a very early stage in respect of the roll-out of heat pumps (whether stand-alone or as part of a heat network), with heat pump sales a fraction of those in the leading European nations, at c. 3,000 in 2018, a fraction of those sold by European nations including France (c.28,000) and Italy (c.20,000).

3.9.8 It follows that a raft of work is ongoing to explore opportunities, for example "Power Parks": *"Parks are also home to a large amount of ambient heat... We can harvest this low carbon thermal energy for our buildings with the help of heat pumps. A heat pump is a cunning device for collecting the ambient heat all around us - in the air, the ground or bodies of water – concentrating it, and pumping it into spaces we need to warm like schools, leisure centres or housing blocks."*[49]

3.9.9 Finally, it is important to note that heat pumps require electricity to operate, hence 'the electrification of heating' has major implications for the electricity supply and distribution network (discussed below). Also, heat pumps provide space heating at a relatively low temperature, hence there is a need for high levels of building thermal efficiency (and a need to boost temperature for hot water purposes).

### Combined heat and power

3.9.10 Heat networks sourcing heat at higher temperatures can source from a Combined Heat and Power (**CHP**) generator (or 'energy station'). CHP allows for combustion efficiencies, in that heat from electricity generation is utilised instead of being wasted. CHP has made an important contribution to decarbonisation efforts over recent years, accounting for 6.9% of the total electricity generated in the UK, and the Government notably launched a £320m Heat Networks Investment Project in 2018.[50] However, the increase in CHP capacity in the UK stalled in about 2010,[51] and it is important to note that very large schemes associated with major industrial locations account for 70% of the CHP power capacity nationally.

[46] Buffa et al (2019). See sciencedirect.com/science/article/pii/S1364032118308608
[47] See leti.london/cedg
[48] Boesten et al. (2019). See adv-geosci.net/49/129/2019/
[49] See wearepossible.org/latest-news/powering-parks
[50] See gov.uk/government/groups/heat-in-buildings
[51] See gov.uk/government/statistics/uk-energy-in-brief-2019

3.9.11 There are two **inherent challenges** associated with using CHP. Firstly, the heat generated is high temperature, which creates challenges for residential space heating. This point is borne out by a review[53] of installed CHP capacity nationally, which finds that CHP is used most effectively in Yorkshire and Humber Region, reflecting the fact that 94% of the CHP heat generated in Yorkshire and Humber is used for industrial purposes.[52] Secondly, CHP is typically fuelled by natural gas and hence is decreasingly seen as a low carbon option relative to electric heating options (heat pumps) as the national grid decarbonises. Whilst it is feasible to use biomass as a fuel this counts for a very low proportion of the UK's installed capacity, around 5% in the South East of England, and can lead to localised air pollution issues.[53]

3.9.12 In the London context, recent guidance (April 2020), confirmed that new CHP still has a role to play, but that there are preferable approaches to heat networks, including utilising locally available waste or ambient heat in conjunction with a heat pump.[54]

### Hydrogen

3.9.13 There is also a need to look ahead to the possible deployment of hydrogen as a readily transportable fuel, which might be used in a similar way to fossil fuels. Specifically, it can either be burnt in an engine, turbine, hob or boiler to create heat or mechanical energy or used in a fuel cell to generate electrical energy.

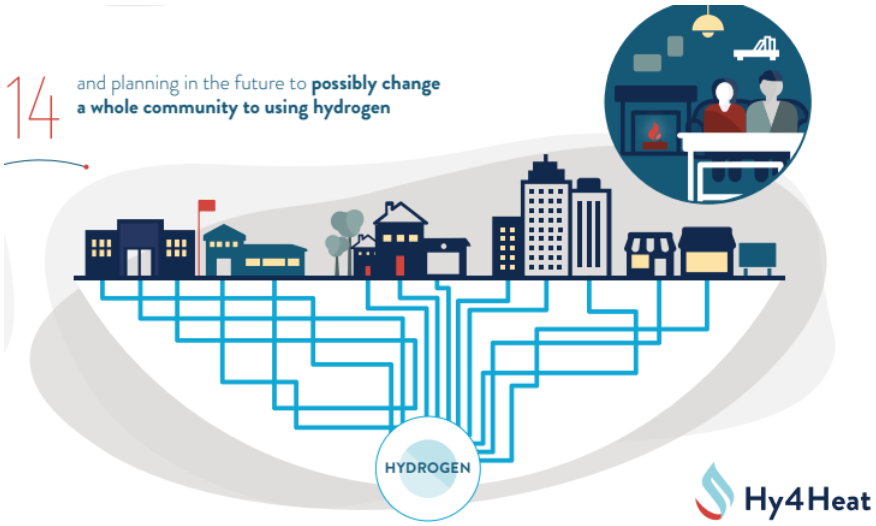
3.9.14 There are various ways to produce low carbon hydrogen, with Government having allocated funding to five low carbon hydrogen projects in April 2020.[55] However, there are major technological barriers, with over 99% of hydrogen produced in 2018 requiring fossil fuels.[56]

3.9.15 Most relevant to Local Plans is the potential use of hydrogen for heating, replacing natural gas (methane), which is a focus of discussion in the UK Government report Clean Growth - Transforming Heating (2018), and also a focus of a major ongoing UK Government project - hy4heat.info. The report explains that:

*"Historically, hydrogen played a key role in heating in the UK, making up approximately 50% of town gas. However, following the switch to natural gas, the safety of using higher concentrations of hydrogen in the current gas system, including appliances, needs to be proven… There is growing interest in understanding how much hydrogen existing gas networks can tolerate without modification to the grid… [However] Full conversion of the gas grid to run on hydrogen… is widely discussed as an option…"*

3.9.16 Figure 3.6 shows the final step in the Hy4Heat 'storyboard', namely the possibility of converting one or more **demonstrator communities** to hydrogen.

*Figure 3.6: The Government's Hy4Heat programme*




[52] The review also finds: "*The region with the largest number of reciprocating engine schemes is London, followed by the South East and the North West. These high population areas have a large number of sites which are well suited to the capacity range and grade of heat offered by reciprocating engines, namely leisure centres, hotels and retail outlets.*"
[53] See gov.uk/government/statistics/energy-trends-september-2019-special-feature-article-combined-heat-and-power-in-scotland-wales-northern-ireland-and-the-regions-of-england-in-20
[54] See london.gov.uk/sites/default/files/gla_energy_assessment_guidance_april_2020.pdf
[55] See gov.uk/government/publications/hydrogen-supply-competition/hydrogen-supply-programme-successful-projects-phase-2
[56] See about.bnef.com/blog/hydrogen-economy-offers-promising-path-to-decarbonization/

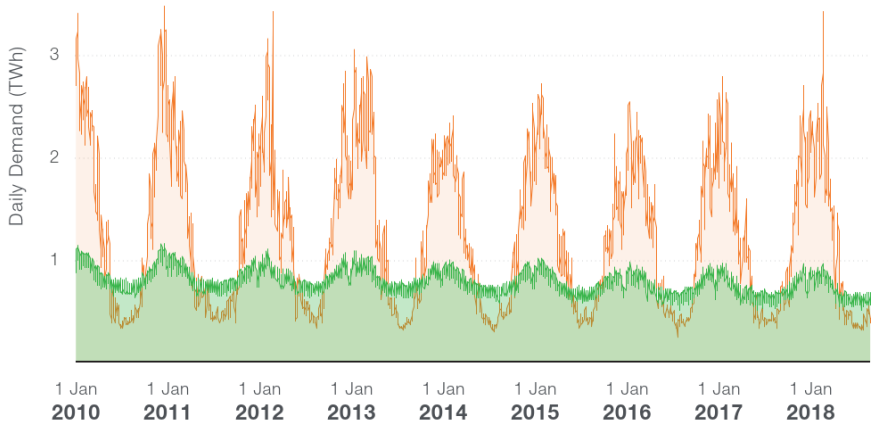
### Biogas

3.9.17 The Transforming Heating report (2018) also discusses the role of biogas; however, there is limited role for Local Plans, as biogas can readily mix with natural gas in the existing gas grid. As with hydrogen, there are complex issues associated with production of biogas at scale. Unlike hydrogen, production at the local level has a role to play, although this is more a matter for the Surrey Waste Strategy.

## 3.10 Transforming the electricity network

3.10.1 Decarbonisation of the electricity system alongside significant changes to peaks in electricity demand due to the electrification of heating and electric vehicles will lead to major challenges in respect of electricity supply, transmission and storage. Figure 3.7 is just one example of a chart serving to communicate the scale of the challenge that would result from the electrification of heating alone.

*Figure 3.7: National daily natural gas (orange) and electricity (green) demand*




3.10.2 There is a need for step-change in respect of **flexibility**, moving beyond the traditional 'supply-side' approach – e.g. ensuring a mix of power stations and a national grid – to new and innovative approaches:[57]

- Demand-side response - **consumers** can sign up to special tariffs and schemes which reward them for changing how and when they use electricity, e.g. for domestic purposes as part of 'smart' EV charging;
- Storage - the use of **batteries** to store energy when there is a surplus, e.g. storage of solar electricity on sunny day for use that evening when demand is highest.

3.10.3 Flexibility is the focus of Future Energy Scenarios, which is the National Grid's flagship decarbonisation project. A recent report calls for 'whole systems' approach and explores four scenarios including a "Community Renewables" scenario that is of particular relevance to Local Plans, although elements of all four will be required. National Grid discuss key interventions including:[58]

- Electric vehicles - **Smart charging** is the 'low-hanging fruit' and will be crucial; however, use of EV batteries for storage is more nuanced and uncertain. Vehicle-to-home charging should have a role to play, as should large-scale vehicle-to-grid (e.g. airport parking, station parking, fleet vehicles), but residential vehicle-to-grid may prove challenging to roll-out widely.
- Managing peak electric heat demand – National Grid explain that "Decarbonising heat is the biggest challenge in reaching net zero, and all net zero pathways involve significant increases in the **electrification of heating**. Understanding the flexibility of this electricity demand for heat will be an important factor in determining the viability and scale of heat electrification."

With regards to smart charging, another recent report published by the Office for Low Emission Vehicles' Energy Taskforce presents a detailed review of the interventions required, concluding:[59]

[57] See ofgem.gov.uk/electricity/retail-market/market-review-and-reform/smarter-markets-programme/electricity-system-flexibility
[58] See fes.nationalgrid.com/bridging/
[59] See lowcvp.org.uk/projects/electric-vehicle-energy-taskforce.htm

*The increasing demand from EVs, potentially compounded by growth in the electrification of heat, brings further challenges, but also opportunities, for the… electricity system. Chargepoints can act as autonomous, active components of the whole electricity system.*

*If these chargepoints and their supporting infrastructure are not designed and operated as an integrated part of the developing Smart Grid, significant costs will be incurred which will ultimately be met by consumers. There is an opportunity for these costs to be significantly reduced if the charging of EVs is used as a flexible resource that is responsive to the needs of the electricity system…*

*This is commonly referred to as **'smart charging'**. It allows the charging of an EV to be intelligently controlled, whether autonomously or by a third party. This control might be related to the price of electricity, its carbon intensity or the availability of electricity system capacity… The present value of these savings to 2050 could be between £2.7bn and £6.5bn."*

3.10.4 It is important to note that the report identifies one of the three priorities for action moving forward as*:*

*"The need for effective **local and national planning** to enable efficient investment, mediating the balance between future-proofing and asset stranding."*

## 3.11 Other policy context

3.11.1 The discussion above has focused on cross-cutting climate change mitigation policy context and then focused-in on policy context in respect of transport, heating and the electricity network. Climate change mitigation is a highly cross-cutting issue, hence there is a range of further topic-specific policy context that is relevant, for example in respect of planning for the natural environment (recognising the potential to take decisions through the Local Plan in support of carbon sequestration) and waste management. Other policy context is discussed as part of the review of Local Plan intervention options, within Section 5.

# 4 What is the baseline scenario?

## 4.1 Introduction

4.1.1 The aim here is to:

- Quantify current emissions across Surrey Heath Borough;
- Estimate the likely situation at the end of the plan period under a baseline decarbonisation scenario;
  - i.e. a scenario assuming implementation of anticipated steps by Government and business in support of decarbonisation along with anticipated societal and behavioural shifts;
- Project forward the calculated baseline decarbonisation scenario to 2050; and
- Consider the difference between the baseline scenario and a 'net zero' decarbonisation scenario.

## 4.1 The current situation

### Introduction

4.1.1 The aim is to quantify emissions ($CO_2e$)[60] in the year 2017 (as the most recent year for which all the required data is available) at the Surrey Heath scale reflecting:

- Surrey Heath Borough Council's buildings and operations;
- Energy used (heating and power) by Surrey Heath residents and businesses;
- Transport movements by Surrey Heath residents and businesses;

[60] $CO_2$ equivalent, abbreviated as $CO_2e$ is a metric measure used to compare the emissions from various greenhouse gases on the basis of their global-warming potential (GWP), by converting amounts of other gases to the equivalent amount of carbon dioxide with the same global warming

- Waste produced by Surrey Heath residents and businesses; and
- Changes relating to Land Use, Land Use Change and Forestry (LULUCF).

4.1.2 These headings are considered in turn, before a final section considers total current emissions at the current time, with accompanying caveats and limitations.

## Surrey Heath Borough Council's assets and operations emissions

4.1.3 In accordance with the Greenhouse Gas Protocol[61] and the Department of Business, Energy and Industrial Strategy (BEIS) 'Emissions Reduction Pledge 2020' guidance,[62] for the purpose of GHG reporting, Surrey Heath Borough Council's own emissions are divided into three categories:

- **Scope 1** – All direct emissions that arise from the activities of Surrey Heath Borough Council. This primarily includes emissions from fossil fuel combustion from sources owned or controlled by the Council such as gas boilers and fleet vehicles, and also includes emissions associated with Land Use, Land Use Change and Forestry (LULUCF) from land that the Council owns.
- **Scope 2** – Indirect emissions associated with the energy purchased and used by the Council, i.e. emissions that result from the burning of fossil fuels at locations outside of Surrey Heath.
- **Scope 3** – Indirect emissions that result from the activities of the Council, occurring from sources that they do not own or control. These include emissions associated with business travel, procurement spend, and emissions associated with the production, transportation, transmission and distribution of scope 1 and 2 fuels and electricity.

### Scope 1 emissions

4.1.4 GHG emissions associated with the non-electricity energy use of the council's buildings and assets, for which it pays bills, have been calculated by multiplying the gas use figure by the Defra 2017 emissions factor for natural gas. Gas use has been determined based on readings from meters for which Surrey Heath Borough Council pays the bills. The total figure for 2017 is **210.6 $tCO_2e$**.

4.1.5 To calculate fleet vehicle emissions, fleet vehicle mileage has been multiplied by the relevant Defra 2017 emissions factor for each vehicle type. The total figure for 2017 is **69.6 $tCO_2e$**.

N.B. fleet vehicle mileage is only available as a total figure for all fleet vehicles (rather than being broken down according to vehicle models). An average distance has been attributed to each, rather than actual 2017 mileage for each vehicle.

4.1.6 With regards to LULUCF emissions, the annual $CO_2$ sequestration potential of the green space owned by Surrey Heath Borough Council was estimated by applying habitat specific carbon sequestration values from the literature.[63] The habitat breakdown of the sites was estimated using aerial and OS base mapping (it was possible to map habitats to 79 out of the 106 identified Council-owned sites), and the carbon sequestration factors were then multiplied by the total area of each habitat. The total carbon sequestered by Council-owned green space in 2017 was estimated to be 195.3 $tCO_2e$, which equates to **-195.3 $tCO_2e$** removed from the atmosphere.

### Scope 2 emissions

4.1.7 GHG emissions associated with the electricity use of the Council's buildings and assets, for which it pays the bills, have been calculated by multiplying the electricity use figure by the Defra 2017 emissions factor for UK electricity. Electricity use has been determined based on readings from meters for which Surrey Heath Borough Council pays the bills. The total figure for 2017 is **422.0 $tCO_2e$**.

[61] See ghgprotocol.org/
[62] See gov.uk/government/publications/emissions-reduction-pledge-2020-emissions-reporting-in-public-and-higher-education-sectors
[63] Each habitat has a different rate at which it sequesters carbon from the atmosphere (for example broadleaved woodland sequesters an average of 4.97 tonnes of $CO_2$ per hectare per year) or emits carbon to the atmosphere (for example agricultural land managed for grazing emits an average of 2.2 tonnes of $CO_2$ per hectare per year).

### Scope 3 emissions

4.1.8 Well-to-tank (WTT) and transmission and distribution (T&D) losses associated with fleet vehicle use and gas and electricity consumption have been calculated by multiplying the mileage and energy use figures used for the above scope 1 and scope 2 calculations by the relevant Defra 2017 WTT and T&D emissions factors. The total figure for 2017 is **122.6 $tCO_2e$**.

4.1.9 GHG emissions associated with grey fleet vehicle use have been calculated by multiplying the mileage for each fuel type by the appropriate Defra 2017 emissions factor and the relevant WTT factor. Direct emissions and WTT emissions have been considered together in this instance as both are considered scope 3 emissions sources. The total figure for 2017 is **38.8 $tCO_2e$**.

4.1.10 Worker commuting statistics detailing the modes of transport used by Council employees have been used to calculate GHG emissions from worker commuting. The number of Council employees using each mode of transport has been multiplied by an assumed average commuting distance of 30km per day,[64] and the resulting mileage has been multiplied by the relevant Defra 2017 emissions factors. WTT emissions have also been included within the total here as direct and WTT emissions are both considered scope 3 emissions sources. The total figure for 2017 is **378.5 $tCO_2e$**.

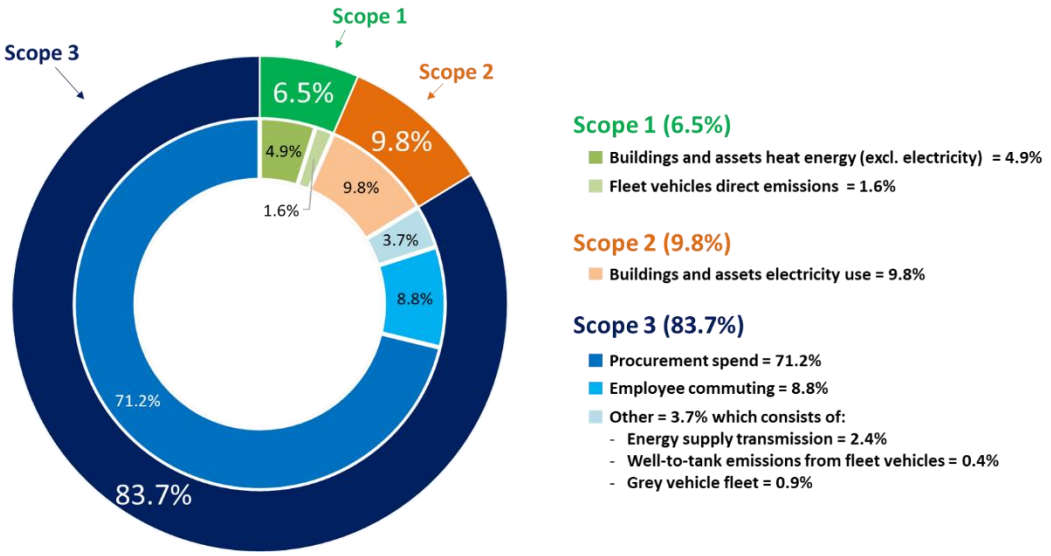
4.1.11 Indirect GHG emissions from the Council's supply chain have been estimated using the Defra 2012 procurement emissions factors (GHG emissions per £ procurement spend for various spend categories, including cleaning, catering, services to buildings and landscape and social care services).[65] The total per annum figure is **3,075 $tCO_2e$**.

N.B. the Defra 2012 procurement spend emissions factors used are based on the most recently published available data from 2011 and therefore may not constitute an entirely accurate representation of the current GHG emissions from procurement activity.

### Total emissions from SHBC's assets and operations

4.1.12 The total *net* emissions figure for 2017 is **4,122 $tCO_2e$**. Excluding the positive impact of LULUCF, the total emissions figure for 2017 is **4,317 $tCO_2e$**. Currently, the greatest contributor to the Council's own GHG emissions is procurement spend, accounting for 71.2% of emissions. Figure 4.1 presents a break-down of total emissions (excluding LULUCF).

*Figure 4.1: Breakdown of Council's own emissions (N.B. sources <0.5% are excluded)*




[64] 30km reflects the findings of a study of average commute distances for rural areas in England (14.6km one way, approx. 30km round trip): https://www.tandfonline.com/doi/pdf/10.1080/02697450902827329
[65] See https://www.gov.uk/government/statistics/uks-carbon-footprint

## Energy (heating and power) use by SH residents and businesses

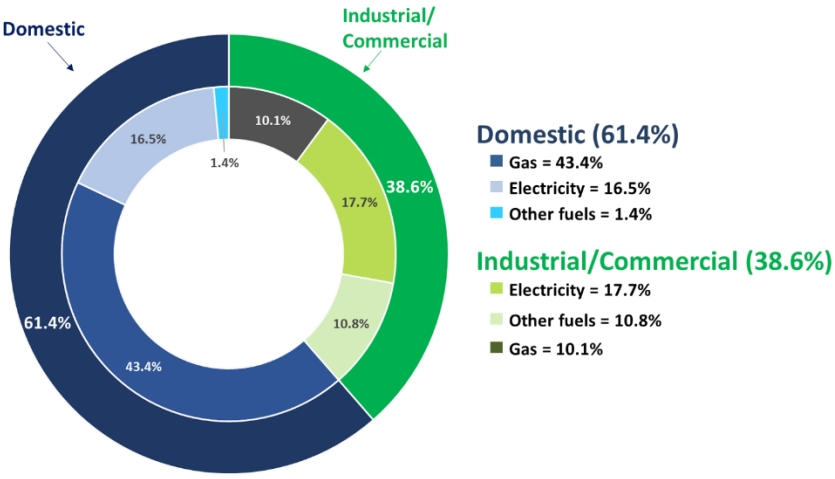
4.1.13 UK National Statistics Data produced by BEIS provide total energy consumption figures by local authority from 2005 to 2017.[66] As this data is based on meter readings, it is considered to be an accurate source for the total energy use emissions within Surrey Heath. However, the method used by BEIS to distinguish between domestic and non-domestic energy use is not considered to be particularly accurate (energy use of less than 50,000 kWh is assumed to be from domestic sources and energy use greater than 100,000 kWh is assumed to be from non-domestic sources; for those between these thresholds, addresses with plc or ltd etc. are assigned to non-domestic).

4.1.14 To overcome these inaccuracies, domestic energy use emissions have been estimated by using domestic Energy Performance Certificate (EPC) data to calculate average household energy use, and multiplying this figure by the number of households in Surrey Heath.[67] Emissions associated with non-domestic energy use have been assumed to account for the remaining emissions (i.e. the BEIS total energy use emissions minus the domestic emissions).

4.1.15 As the BEIS National Statistics Data and EPC data only account for emissions of $CO_2$, these figures have been adjusted to account for all seven Kyoto Protocol GHGs and are presented here as $tCO_2e$. The emissions figures have been adjusted using a scaling factor developed based on the proportionate difference between the Defra 2017 emissions factors for $CO_2$ emissions and $CO_2e$ for UK electricity use.

4.1.16 The total figure for 2017 is **274,756 $tCO_2e$**, which breaks down as 147,184 $tCO_2e$ from gas, 93,982 $tCO_2e$ from electricity and 33,590 $tCO_2e$ from other fuels. It is also possible to break this down according to whether the source is domestic or non-domestic (retail, business and industry) – see Figure 4.2.

*Figure 4.2: Breakdown of heat/power emissions by source (N.B. sources <0.5% are excluded)*




## Transport movements by SH residents and businesses

4.1.17 The BEIS National Statistics Data for Surrey Heath has been used for the transportation emissions baseline. This data is based on automated number plate recognition (ANPR) data.

4.1.18 While the vehicle mix making up these traffic movements is not known, the DfT registered vehicle mix for Surrey Heath provides an indication as to the owned vehicle mix on Surrey Heath's roads (though this is not exact due to vehicles registered outside SH travelling in and vice versa and does not consider HGVs and public transport, which is included within the ANPR data). This dataset shows that 87% of registered vehicles are private cars, whilst 7.3% are light goods vehicles and 4% are motorcycles.

4.1.19 The total figure for 2017 is **137,920 $tCO_2e$**, which breaks down as 136,726 $tCO_2e$ from road transport and 1,194 $tCO_2e$ from other transport modes. N.B. transport movements for waste disposal have been excluded, as they are considered below.

[66] See gov.uk/government/statistics/uk-local-authority-and-regional-carbon-dioxide-emissions-national-statistics-2005-to-2017
[67] See epc.opendatacommunities.org/login

## Waste produced by SH residents and businesses

4.1.20 Local authority waste data produced by Defra[68] have been used to estimate emissions associated with waste disposal in Surrey Heath. The Defra database provides a breakdown of domestic and non-domestic waste quantities for each waste disposal method ('green recycling', 'dry recycling' and 'not recycled').

4.1.21 As the Defra waste data are only available for each financial year, assumptions have been made using the data from 2016/17 and 2017/18. To estimate waste quantities for 2017 only, 25% of the 2016/17 data has been combined with 75% of the 2017/18 data, assuming that waste disposal quantities are fairly consistent across the year. The domestic waste quantities estimated by this method are largely consistent with domestic waste quantities provided by Joint Waste Solutions for 2017.

4.1.22 Waste quantities for each disposal method have been multiplied by the following Defra 2017 emissions factors: Green recycling - average of the emissions factors for composting and anaerobic digestion; Dry recycling - average of the emissions factors for recycling metals, glass, paper/ card, textiles, plastic and WEEE; and Not recycled - emissions factor for combustion.[69]

4.1.23 The total figure for 2017 is **547 $tCO_2e$**, which breaks down as 541 $tCO_2e$ from domestic sources and 6 $tCO_2e$ from businesses.

## Land Use, Land Use Change and Forestry (LULUCF)

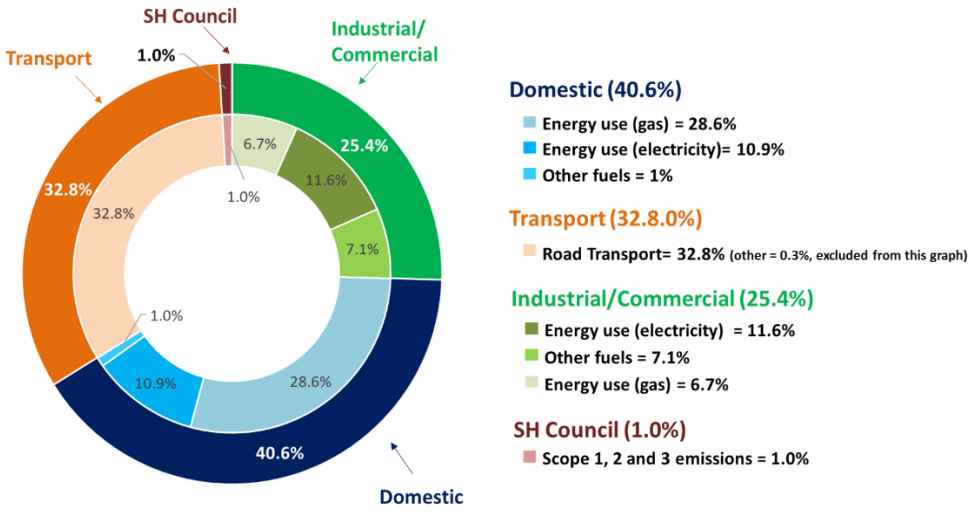
4.1.24 Annual $CO_2$ emissions from LULUCF was collected from the BEIS Local Authority estimates for 2017. This estimate includes both sources of carbon emissions to the atmosphere and sinks of carbon emissions from the atmosphere.[70]

4.1.25 In order to avoid double counting, the carbon sequestration estimate for the green spaces owned by the Council was subtracted from the Surrey Heath LULUCF estimate from BEIS. Therefore, the total carbon sequestered within Surrey Heath by non-Council-owned green space in 2017 was estimated to be 10,336 $tCO_2e$, which equates to **-10,336 $tCO_2e$** removed from the atmosphere.

## Total emissions

4.1.26 The total per annum figure for *net* emissions in the 'current baseline' year of 2017 was **407,009 $tCO_2e$**. Excluding the positive impact of LULUCF, the total emissions figure for 2017 is **417,346 $tCO_2e$.** The greatest contributor to this is domestic energy use, accounting for 41% of emissions, with road transport (excluding motorway travel) the next greatest contributor. The Council's own emissions account for approximately 1%, whilst LULUCF represents a net carbon sink of -10,531 $tCO_2e$ in total.

*Figure 4.3: Breakdown of current baseline emissions (N.B. sources <0.5% are excluded)*




[68] See gov.uk/government/statistics/local-authority-collected-waste-management-annual-results
[69] According to Joint Waste Solutions, domestic waste collected for refuse is non-recyclable material that is sent for alternative disposal (Energy from Waste in Surrey). The same has been assumed for non-domestic waste that is not recycled.
[70] See gov.uk/government/statistics/mapping-carbon-emissions-and-removals-for-the-land-use-land-use-change-and-forestry-sector

### Limitations

4.1.27 A series of limitations associated with calculating the Borough's emissions has already been presented above. Further limitations include:

- Emissions sources excluded from the GHG emissions baseline include motorway transportation, diesel railways and energy use from large industrial installations as these are considered to be out of the scope of influence of local authorities by BEIS.[71]
- Construction emissions are not accounted for within the calculations as it has not been possible to accurately estimate these emissions using the data available.
- Fugitive emissions (e.g. refrigeration gases) are not accounted for within the calculations as it has not been possible to accurately estimate these emissions from the data available.
- For the energy use calculations, only EPCs from the last 10 years have been used, as the EPC guidance[72] states EPC certificates are valid for 10 years after issue. EPCs from the last ten years are more likely to be for newer properties, and therefore more energy efficient than the actual Borough average.
- Energy use from electric rail is included in the non-domestic energy use data and can't be disaggregated due to the nature of the BEIS data. Therefore, although switching from diesel to electric rail would result in an emissions reduction, in the context of this baseline it would appear as an increase in emissions (as the decrease in diesel would not be accounted for as diesel rail is excluded from the baseline).
- The road transport emissions calculations include road transport consumption of diesel and petrol only. Any electricity consumed (via chargers within the Surrey Heath area, not necessarily by vehicles within SH) is included within the energy use figures.

## 4.2 The future situation

### Introduction

4.2.1 The aim is to quantify likely emissions at the end of the Local Plan period (2040) under the same headings used above to explore the current situation.

4.2.2 Specifically, the aim under each heading is to quantify the extent to which emissions are likely to increase or decrease over the plan period, assuming implementation of anticipated steps by Government and businesses in support of decarbonisation along with anticipated societal and behavioural shifts.

4.2.3 The reasoning behind calculations is inevitably based on a wide range of assumptions. The aim of this section is to discuss reasons and **assumptions** in brief, recognising that further detail on policy interventions relating to decarbonisation is presented within other sections of this report.

### Surrey Heath Borough Council's assets and operations emissions

4.2.4 For existing Council-owned buildings, an overall reduction in emissions (scope 1 and scope 2) of **363 $tCO_2e$** has been estimated, based on the following assumptions:

- A reduction in emissions of 89% has been assumed for electricity use to account for future grid decarbonisation, based on the projected UK grid emissions intensity for 2040 in comparison to the 2017 Defra emissions factor used for the current baseline;[73]
- An increase in emissions of 13% has been assumed for electricity use to account for an increase in EV plugins, based on a forecast increase in peak electricity demand of 4-14% by 2050;[74]
- The use of gas and 'other' fuels are assumed to remain stable for existing buildings, on the assumption that buildings are not retrofitted with upgraded energy technologies.

[71] See gov.uk/government/statistics/uk-local-authority-and-regional-carbon-dioxide-emissions-national-statistics-2005-to-2017
[72] See epc.opendatacommunities.org/docs/guidance#general_background
[73] See assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/793632/data-tables-1-19.xlsx
[74] See carbonbrief.org/rise-uk-electric-vehicles-national-grid-doubles-2040-forecast

4.2.5 For transport, an overall emissions reduction of **286 $tCO_2e$** has been estimated, assuming that:

- Current fleet vehicles will remain in place or be replaced with similar vehicles as a worst-case estimate, and therefore there has been no change modelled for the Council's owned fleet;
- For grey fleet and commuter vehicles, projected changes in vehicle ownership for petrol, diesel, electric and hybrid vehicles for the general UK population based on recent trends have been applied.[75] The projections assume a growth in electric and hybrid vehicles on the road in line with market changes for car ownership between 2019-2020 (for example, a 2.9% increase in fully EV ownership, and a 4.8% decrease in petrol car ownership). It has been assumed that mileage for business travel and commuting will remain similar to 2017.

## Energy (heating and power) use by SH residents and businesses

4.2.6 Various assumptions around future energy scenarios have been made and applied to the GHG emissions figures for domestic and non-domestic energy use to estimate GHG emissions for 2040.

4.2.7 For existing domestic and non-domestic buildings, an overall reduction in emissions of **82,270 $tCO_2e$** has been estimated, based on the following assumptions:

- A reduction in emissions of 89% has been assumed for electricity use to account for future grid decarbonisation, based on the projected UK grid emissions intensity for 2040 in comparison to the 2017 Defra emissions factor used for the current baseline;[76]
- An increase in emissions of 13% has been assumed for electricity use to account for an increase in EV plugins, based on a forecast increase in peak electricity demand of 4-14% by 2050;[77]
- The use of gas and 'other' fuels are assumed to remain stable.

4.2.8 Included within this total reduction is a slight increase in annual emissions of **286.90 $tCO_2e$** anticipated as a result of new housing developments, based on the following assumptions:

- Around 5,000-7,000 new homes are anticipated by 2040, albeit recognising that this figure is subject to change;
- An energy efficiency of 52 kWh/ $m_2$/ year has been assumed for new homes, in line with the 2013 changes to Part L of Building Regs;[78]
- Floor areas of new houses are estimated based on RIBA estimates (albeit recognising that a more stringent approach is likely to be sought through the new Local Plan);[79]
- 25% of new houses are assumed to use a mix of electricity and gas, to which the proportionate contribution of electricity / gas from BEIS 2017 energy use data (27.6% / 72.4%) has been applied;
- 75% of new houses are assumed to use electricity only;
- An increase in emissions of 13% has been applied to electricity use to account for an increase in EVs; and
- A 75% reduction in energy emissions has been assumed based on the Future Homes Standard;[80]

4.2.9 No additional energy use has been accounted for in relation to new, non-domestic developments as no significant non-residential developments are anticipated.

[75] See smmt.co.uk/vehicle-data/car-registrations/
[76] See assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/793632/data-tables-1-19.xlsx
[77] See carbonbrief.org/rise-uk-electric-vehicles-national-grid-doubles-2040-forecast
[78] See designingbuildings.co.uk/wiki/2013_changes_to_the_approved_documents_for_part_L_of_the_building_regulations
[79] See architecture.com/-/media/gathercontent/space-standards-for-homes/additional-documents/ribacaseforspace2011pdf.pdf
[80] See assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/852605/Future_Homes_Standard_2019_Consultation.pdf

## Waste produced by Surrey Heath residents and businesses

4.2.10 An overall decrease in emissions of **2.33 $tCO_2e$** has been estimated in relation to waste disposal by 2040, compared to the 2017 baseline.

4.2.11 For domestic waste disposal, the 2040 future baseline emissions figure has been estimated by first calculating the average percentage change in waste totals for each waste stream (green recycling, dry recycling and non-recycled waste) per year between 2014/15 and 2017/18, using the local authority waste data produced by Defra.[81] For 2040, the percentage share of each waste stream is estimated to be 44.6% for green recycling, 14.8% for dry recycling and 40.5% for non-recycled waste.

4.2.12 To forecast the total waste quantity for 2040, the average annual change in total waste between 2014/15 and 2017/18 was calculated and multiplied by the number of years until 2040. The forecast share for each waste stream, as described above, was then applied to this forecast total to estimate total waste for each waste stream for 2040. These totals were then multiplied by the Defra 2017 waste disposal emissions factors, as used for the 2017 baseline calculations.

4.2.13 It has not been possible to realistically estimate non-domestic emissions for 2040 as the Defra waste data used for the domestic future waste modelling is inconsistent, and therefore no change has been modelled. However, any increase or decrease is anticipated to be negligible in the context of the overall footprint as non-domestic waste disposal emissions represents <1% of total waste emissions for the 2017 baseline.

## Transport movements by SH residents and businesses

4.2.14 Road transport represents the most significant area of change by 2040 in the modelled projections, with an overall emissions reduction of **82,973 $tCO_2e$.** This has been estimated based on the following assumptions:

- Population is assumed to increase at a steady rate for Surrey Heath based on historical rates, representing an 10% increase in population by 2040, and the total vehicle ownership estimates have been increased in accordance with this percentage increase (assuming a linear relationship between increasing population and increasing ownership);
- Transport 'other' (which includes lubricants and from vehicles which run on LPG, emissions from inland waterways, coal combustion in the rail sector and aircraft support vehicles, which have minimal impact on emissions but are included for completeness as this element is included within the BEIS local authority influence data) has decreased by 27% over the last 12 years according to BEIS data trends,[82] and it has been assumed that the same rate of change will continue up to 2040;
- The range of traffic growth forecast is 17% to 51% between 2015 and 2050,[83] an approximate increase in mileage of 1% year on year;
- Projected changes in vehicle ownership for petrol, diesel, electric and hybrid vehicles for the general UK population based on recent trends have been applied.[84] The projections assume a growth in electric and hybrid vehicles on the road in line with market changes for car ownership between 2019-2020 (for example, a 2.9% increase in fully electric car ownership, and a 4.8% decrease in petrol car ownership).

## Land Use, Land Use Change and Forestry (LULUCF)

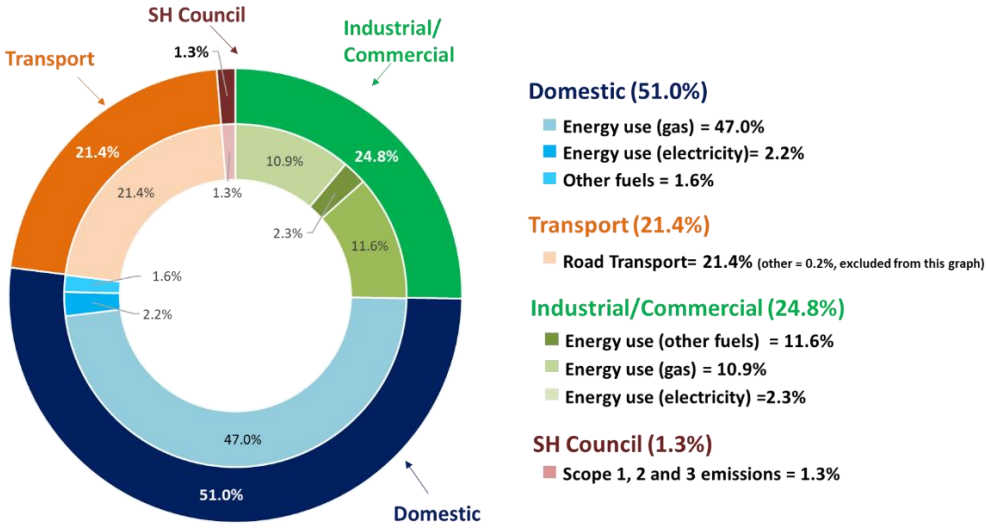
4.2.15 It has been assumed that there will be negligible change to LULUCF by 2040 (i.e. no net loss and no net gain of carbon sinks).

[81] See gov.uk/government/statistics/local-authority-collected-waste-management-annual-results
[82] See gov.uk/government/statistics/uk-local-authority-and-regional-carbon-dioxide-emissions-national-statistics-2005-to-2017
[83] See assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/873929/road-traffic-forecasts-2018-document.pdf
[84] See smmt.co.uk/vehicle-data/car-registrations/

## Total emissions

4.2.16 On the basis of the calculations presented above total *net* emissions in 2040 will amount to **244,265 $tCO_2e$**. Excluding the positive impact of LULUCF, the total emissions figure for 2017 is **254,602 $tCO_2e$**. As per 2017, in 2040 the greatest contributor remains domestic energy use, followed by road transport (excluding motorway travel), although the proportion of total emissions from road transport sources decreases significantly (from the current position). Figure 4.4 presents a breakdown.

*Figure 4.4: Estimate of potential emissions source breakdowns in 2040*




### Limitations

4.2.17 A series of limitations associated with calculating baseline emissions has already been presented above. Further limitations include:

- Housing growth quantum is subject to change.
- Government energy projections have been used to estimate the likely emission factor of the electricity grid in 2040, however, this depends on several external factors and can be modelled according to various scenarios (e.g. speed of uptake of renewable energy).
- A conservative estimate of a 13% increase in energy demand to account for EV plug-ins has been applied, however, the range is uncertain (between 4-14% by 2050) and, in reality, may be higher or lower depending on the speed of uptake of EVs and the source of electricity. The estimates used are also for electricity use at peak times, and therefore this figure will vary according to timeframe considered.
- It has been assumed that the proposals for the current consultation draft of the Future Homes Standard will be accepted into planning policy, however, at this current time, no decisions have been finalised on the 70-80% reduction in emissions based on 2013 Part L of the Building Regulations.
- Trends in vehicle ownership and mileage have been projected based on recent trends, pace of change and Government targets; however, in reality it is difficult to predict the speed of uptake of EVs due to the variety of different challenges for different vehicle types (e.g. cars, vans, HGVs etc.) and the rate of technological advancements (e.g. in battery storage technology and charging infrastructure).
- Defra Emissions factors for waste disposal (2017) and procurement spend (2011) are likely to change in the future.
- Due to significant timeframe that projections have been applied over (23 years from the 2017 baseline) there will be external changes and developments that will impact on Surrey Heath's carbon emissions that may not have been quantified in this study; however, the future baseline figures presented are intended to provide a likely estimate for a realistic and achievable emissions reduction trajectory.

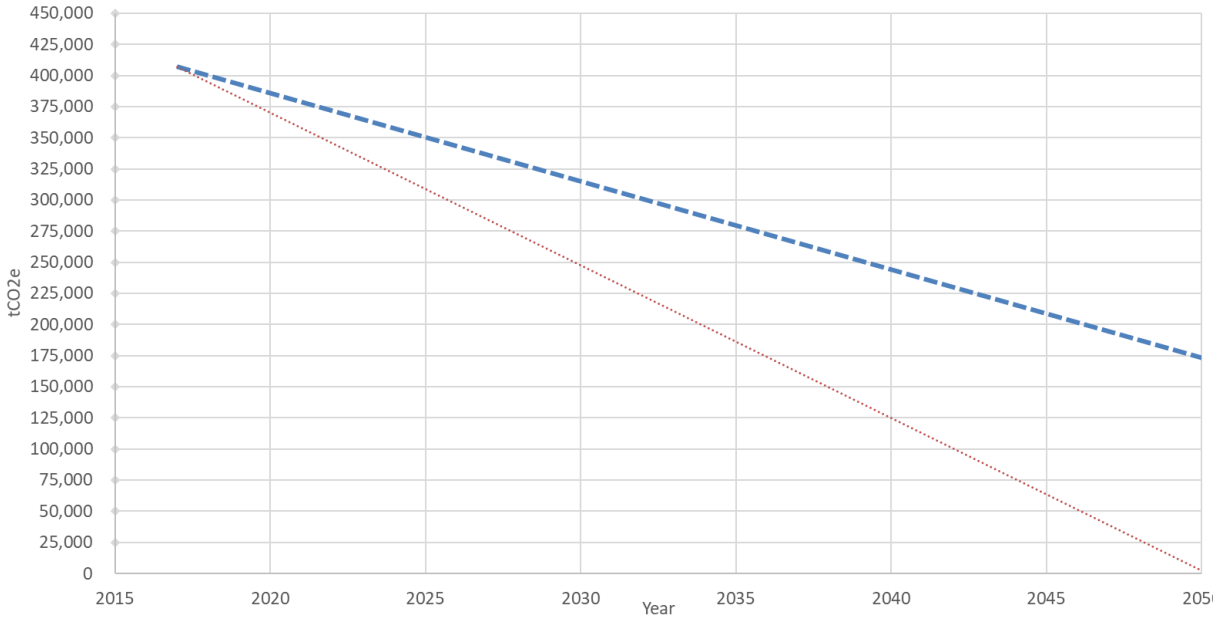
4.2.18 In summary, it is emphasised that there is a high level of uncertainty associated with future emissions calculations due to a rapidly changing policy landscape around climate change and carbon as the UK transitions to net zero carbon emissions in 2050. Government policy and the speed of development and uptake on new technology will heavily influence SH's future GHG emissions.

## 4.3 Conclusions on the baseline scenario

4.3.1 As discussed, there is a need to: plot the calculated rated of decarbonisation between now and the end of the plan period; project this baseline decarbonisation scenario forward to 2050; examine the difference between the baseline scenario and a 'net zero' scenario; and consider implications for the Local Plan.

4.3.2 Figure 4.5 plots the calculated emissions figures for the years 2017 and 2040, and projects forward to 2050 (assuming a steady rate of decarbonisation) and shows an alternative, steeper decarbonisation trajectory that would see the Borough achieve net zero emissions by 2050.

*Figure 4.5: A baseline emissions reduction scenario and a 'net zero 2050' scenario*




4.3.3 Key messages to take from the chart are as follows:

- The baseline scenario sees emissions reducing from a current position of just over 400,000 $tCO_2e$ to approximately 245,000 $tCO_2e$ by 2040, a circa **40% reduction**.
- To be on track to achieve net zero by 2050, there will be a need to achieve emissions of approximately 125,000 $tCO_2e$ in 2040, or a circa **70% reduction**.

4.3.4 The difference between these two decarbonisation trajectory scenarios serves to emphasise the scale of the challenge and, in turn, serves to frame the review of Local Plan intervention options presented below. The review of intervention options is also framed by the breakdown of emissions sources in Surrey Heath:

- Domestic and transport emissions dominate (with domestic highest, contrary to the national picture);
- Emissions from transport are set to decline significantly under the baseline scenario, but are still set to be a major source of emissions in 2040, and there is potential to intervene through the Local Plan;
- Industry and commerce emissions are also significant, but there is less potential for the Local Plan to intervene with respect to these;
- Other emissions sources are much less significant, but can be addressed through the Local Plan;
- The Local Plan can also seek to support carbon sequestration through influencing LULUCF; however, the quantum of CO2e that can be sequestered is very small compared to emissions.

# 5 Review of intervention options

## 5.1 Introduction

5.1.1 The aim of this section is to review potential Local Plan interventions that might feasibly be taken forward through the Surrey Heath Local Plan, subject to further consideration of cumulative implications for Local Plan viability and the achievement of wider Local Plan / sustainable development objectives.

5.1.2 The review is presented under thematic headings established on the basis of the context and baseline review presented above. The order of thematic headings reflects a broad understanding of importance / potential to *"contribute to radical reductions in greenhouse gas emissions"* (NPPF para 148).

5.1.3 Specifically, the review is presented under the following headings:

- Spatial strategy
- Masterplanning and design
- Buildings emissions standards
- Heat networks
- Renewable power
- Low carbon transport
- Other interventions

## 5.2 Spatial strategy

5.2.1 Transport emissions are set to decrease significantly over coming years with the roll-out of EVs; however, there is nonetheless a need to significantly reduce the **demand for transport** (i.e. the distance people and goods are transported) and achieve a **modal shift** away from the private car.

5.2.2 The Local Plan can do most to support achievement of this objective through the setting of spatial strategy. There are broadly four aspects of spatial strategy:

1) Development quanta, i.e. the amount of development (primarily housing) to deliver over the plan period;

2) Broad distribution of development between sub-areas and settlements;

3) Finding a balance between strategic growth locations and smaller sites;

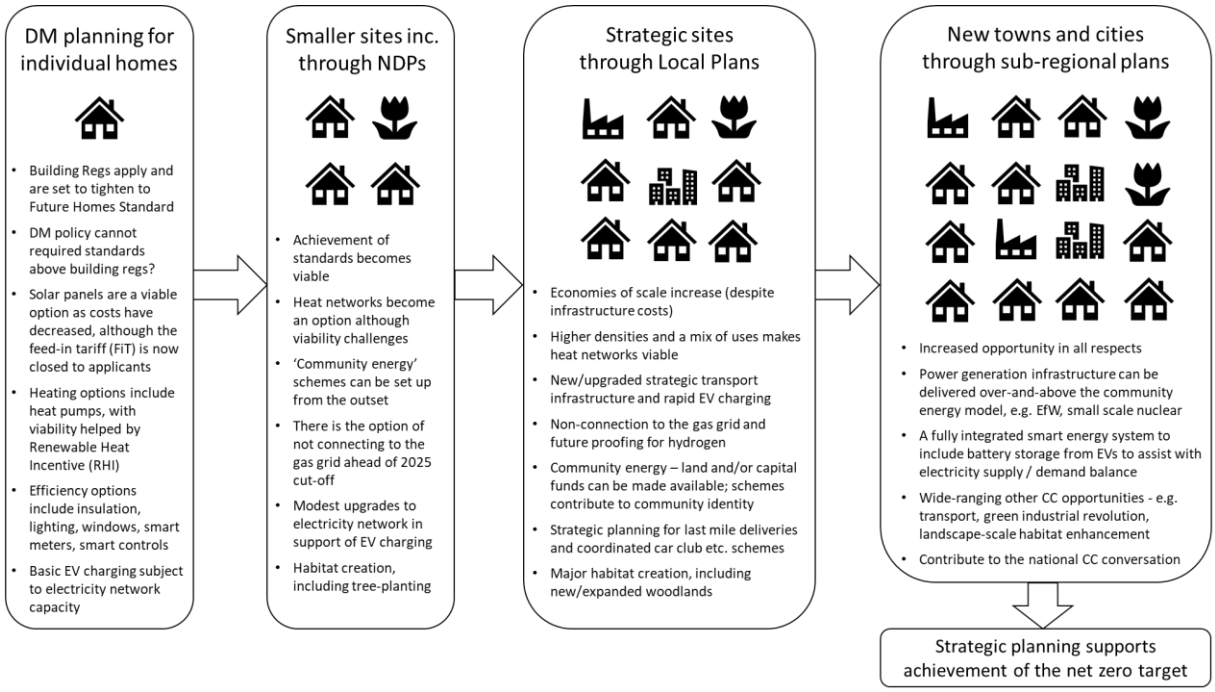
4) Selecting sites for allocation.

5.2.3 Aspect **(1)** is less relevant here, in that there is not likely to be much in the way of a policy choice open to the Council. The Surrey Heath Local Plan will need to either provide for Local Housing Needs (LHN) or possibly a quantum of new homes below LHN on the basis of environmental and policy constraints, in particular the Thames Basin Heaths Special Protection Area (SPA) and the Green Belt.

5.2.4 With regards to aspects **(2)**, **(3)** and **(4)** there will be choices to be made with a significant bearing on GHG emissions from transport. Spatial strategy has a bearing on accessibility to services, facilities, retail and employment, high quality public transport services and high quality walking and cycling infrastructure. Furthermore, spatial strategy has a bearing on the ability to achieve ambitious building emissions standards, deliver low carbon heat and power supply infrastructure and take a wide range of other steps in support of decarbonisation.

5.2.5 One important spatial strategy consideration is in respect of the degree to which there is support for concentration of growth at one or more strategic sites. As a broad generalisation, strategic growth locations can support a good mix of uses within a given area (e.g. local retail, amenity etc. – supportive of climate change mitigation objectives) and lead to economies of scale that enable delivery of new or upgraded infrastructure (transport, community, low carbon heat/power, green etc.) that support climate change mitigation objectives.

*Figure 5.1: Climate change mitigation opportunities potentially associated with development at scale*




5.2.6 In **conclusion**, further work should be undertaken to establish spatial strategy alternatives and scrutinise their merits in respect of climate change mitigation objectives. This can happen through the Local Plan Sustainability Appraisal (SA) process, informed by a detailed understanding of strategic spatial constraints and opportunities. It is beyond the scope of this study to discuss particular growth locations or strategy options that might be explored; however, it is fair to suggest that there should be a focus of attention on the most 'accessible' locations within the Borough, and also that the Local Plan might explore options involving a focus of growth at one or more strategic growth locations, including Camberley town centre.

## 5.3 Masterplanning and design

5.3.1 There is a need to differentiate here between masterplanning and urban design at the development site level, versus design of individual buildings.

### Masterplanning and urban design

5.3.2 The Local Plan will set borough-wide **development management** (DM) policy to guide the masterplanning and design of development at any given site as well as site-specific DM policy for select strategic sites. There is also the potential to establish DM policy for sub-areas within the Borough.

5.3.3 Masterplanning and urban design can be conceptualised as the two steps that follow-on sequentially from a decision on spatial strategy; however, in practice these steps are overlapping rather than sequential. For example, and notably, a decision on the number of homes to assign to **Camberley town centre** will need to be made *after* having explored detailed options for what can be achieved, building on the Camberley Town Centre Masterplan and Public Realm Strategy SPD 2015.

5.3.4 The **PPG** on Design signposts to the National Design Guide for detailed guidance, and also advocates application of the Building for Life assessment framework:[85]

- **National Design Guide** – design must reflect the "three Cs" of Climate, Character and Community (see Figure 5.2). Concepts defined within the Guide include:[86]
  - Accessibility - the ability of people to move around an area and reach places and facilities;
  - Compact form of development - relatively high residential density and an 'urban' layout;
  - Walkable - local facilities are generally no more than a 10 minute walk (800m radius);

[85] gov.uk/guidance/design
[86] gov.uk/government/publications/national-design-guide

– Destinations - integration of/with places people want to visit;
– Movement network - linked routes and connections for people and vehicles;
– Sustainable transport mode - walking, cycling, low emission vehicles, car sharing and public transport; and
– Green corridor – an uninterrupted network that acts as a linkage for wildlife, and potentially for people.

- **Building for Life** – nine of the 12 criteria must be met in order to attain the accreditation, with 'outstanding' accreditation where a development meets all the criteria. Criteria include:[87]

– Does the development provide (or is it close to) community facilities and workplaces?
– Does the scheme have good access to public transport to help reduce car dependency?
– Is the scheme designed to make it easy to find your way around?
– Are streets designed in a way that encourage low vehicle speeds and uses as social spaces?
– Is there adequate external storage space for bins and recycling as well as vehicles and cycles?

*Figure 5.2: Climate as a key component of a well-designed place; an example of cycle infrastructure*


5.3.5 Potentially an overriding consideration, in respect of masterplanning and design from a climate change mitigation perspective, is the need to support **walkable neighbourhoods**. As explained within the Urban Design Compendium (Llewelyn-Davies, 2000), a successful and sustainable local neighbourhood is a product of the distances people have to walk to access daily facilities, the presence of a sufficient range of such facilities to support their needs, and places and spaces where a variety of activities can take place. A walkable neighbourhood is an area within which it is possible and indeed desirable to walk to access services, facilities retail and ideally employment.

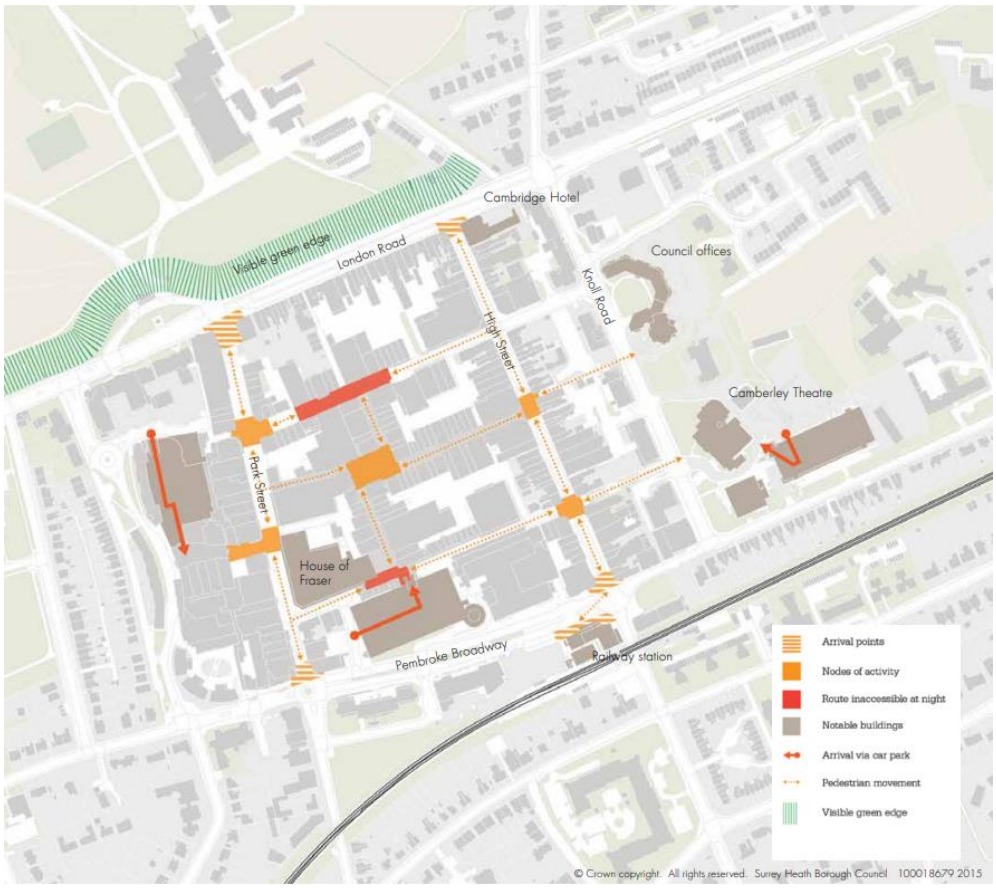
5.3.6 Linked to the objective of supporting delivering walkable neighbourhoods are objectives relating to: maximising **densities** in proximity to activity nodes and transport hubs / corridors; ensuring a **hierarchy of centres**, each with a clear role and offer; delivering a **mix of uses** at a fine-grained scale, e.g. not missing opportunities to deliver new schools, areas of accessible open / green space and children's play spaces; delivering new **employment land** where possible as part of mixed use developments, as opposed to relying on new employment land to come forward solely at strategic employment locations; and delivering a comprehensive and logical **movement framework**, i.e. a situation whereby the different modes of transport fit together and switching between modes is made quick and easy, e.g. a train station should act as a transport hub that is well served by bus services and walking/cycling infrastructure.

5.3.7 On the matter of urban design for sustainable transport, Greenpeace recently (June 2020) proposed:[88]

[87] designcouncil.org.uk/resources/guide/building-life-12-third-edition
[88] See greenpeace.org.uk/resources/green-recovery-manifesto/

*"Local authorities… in all major urban areas should create networks of low-traffic neighbourhoods, or **'Mini-Hollands'**... This involves significantly restricting through traffic in residential and shopping streets by means of bus gates, bollards and planters, and creating area-wide networks of direct walking and cycling routes for all ages and abilities, including sufficient cycle storage... Pedestrians and cyclists should also be given priority along main roads by widening pavements, introducing cycle lanes, removing car parking spaces and introducing more seating, trees and planters." [emphasis added]*

*Figure 5.3 Walking corridors and barriers in Camberley Town Centre*[89]




5.3.8 A further urban design consideration relates to **parking standards**. This is a complex policy area, including due to the fragmented governance picture, which sees Surrey Heath BC responsible for off-street parking and Surrey County Council responsible for on-street parking. There are strong climate change mitigation arguments for defining *maximum* parking standards, with Surrey County Council "commending" this approach to local authorities.[90] It is also an approach that has been advocated by the Government in the past, although this is no longer the case, following a 2015 Written Ministerial Statement:[91] *"The imposition of maximum parking standards under the last Administration lead to blocked and congested streets and pavement parking. Arbitrarily restricting new off-street parking spaces does not reduce car use… The market is best placed to decide if additional parking spaces should be provided."* There are also arguments against setting maximum standards, from a climate change mitigation perspective, as problematic on-street parking can lead to polluting 'start-stop' traffic, impact on bus timetables, dissuade cyclists and hinder footway users including wheelchair and mobility scooter users); also, there is a need to consider EV charging. Epsom and Ewell BC recently (post-NPPF) adopted *minimum* parking standards,[92] and this is an approach currently under consideration elsewhere in Surrey.[93] There is also the potential to define precise standards, as per the adopted Windlesham NDP;[94] however, a policy of this nature could prove too inflexible at the Borough-scale.

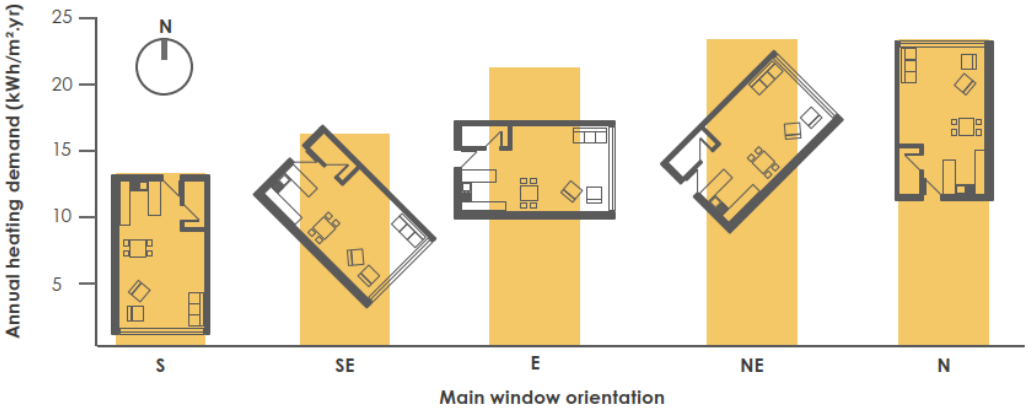
[89] See surreyheath.gov.uk/residents/planning/planning-policy/supplementary-planning-documents
[90] See surreycc.gov.uk/roads-and-transport/policies-plans-consultations/transport-plan/surrey-transport-plan-strategies/parking-strategy
[91] See parliament.uk/business/publications/written-questions-answers-statements/written-statement/Commons/2015-03-25/HCWS488/
[92] See epsom-ewell.gov.uk/residents/planning/planning-policy/supplementary-planning-documents-and-other-guidance
[93] See draft Guildford DM policies at: http://www2.guildford.gov.uk/councilmeetings/ieListDocuments.aspx?CId=264&MId=886
[94] See surreyheath.gov.uk/residents/planning/planning-policy/neighbourhood-planning

## Building design

5.3.9 As explained within the recent LETI "Climate Emergency Design Guide", key building design considerations relate to:

- Orientation – the guidance explains that: "In the UK over the course of a year, North facing windows nearly always lead to net heat loss, whereas south facing ones can normally be designed to achieve a net heat gain. However, the amount of South facing glazing should also be optimised to prevent the risk of summer overheating. Although East/West windows can provide useful gains, they can often lead to overheating due to the low angle of the sun at the start/end of the day."
- Glazing ratio – the guidance explains that: "The optimum glazing ratios for the UK climate are up to 25% glazed on the southern elevation, no more than 20% on the East/West elevations and as little as possible on the Northern elevation."
- Form factor - the guidance explains that "a building's form factor is the ratio of its external surface area to the internal floor area. The greater the ratio, the less efficient the building and the greater the energy demand. Detached dwellings will have a high form factor, whereas apartment blocks will have a much lower form factor and thus will tend to be more energy efficient."

*Figure 5.4: The impact of main window orientation on annual heating demand (LETI, 2020)*




5.3.10 The above design considerations relate to **minimising heating demand**; however, there is also a need to avoid summer **over-heating**, which is both a climate change mitigation (because of the need to avoid air conditioning) and adaptation consideration. The London Plan includes a 'Cooling Hierarchy':[95]

1. Reduce the amount of heat entering a building in summer through orientation, shading, albedo, fenestration, insulation and green roofs and walls;
2. Manage the heat within the building through exposed internal thermal mass and high ceilings;
3. Passive ventilation;
4. Mechanical ventilation;
5. Active cooling systems.

5.3.11 There is good potential to set Local Plan policy in respect of (1) and (3) in particular.

5.3.12 With regards to (1), one point to note is that shading can be achieved through the use of balconies, external walkways or corridors and / or locating deciduous trees along the (non-north) facades of buildings.

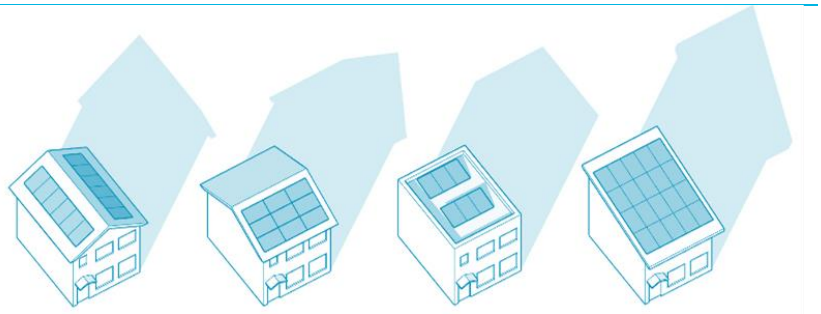
5.3.13 With regards to (3), one point to note is that passive ventilation is inherently challenging with single aspect units, which do not benefit from a through-flow of air. Also, ventilation has implications for indoor air quality, noise levels and security. The transition to EVs may support effective ventilation, as decreased traffic-related pollution might mean that people feel more comfortable opening windows.

[95] See london.gov.uk/sites/default/files/energy_assessment_guidance_2018.pdf

5.3.14 Finally, in respect of point (2), namely the matter of using materials with a high thermal mass, it is important to note that such materials (in particular concrete) tend to have a high embodied carbon content.

5.3.15 A further building design related consideration is in respect of **supporting solar PV**, which might be delivered at the time of construction, or added at a later date. In the figure below, House 4, which has a south-facing mono-pitch roof, would generate roughly 3.5 times more electricity than House 3.[96]

*Figure 5.5. Comparison of the electricity generation from PV on houses with different roof shapes*



| | House 1 | House 2 | House 3 | House 4 |
|---|---|---|---|---|
| Description | Dual pitch | Dual pitch | Flat roof | Mono-pitch |
| Orientation | East/West | South | South | South |
| Electricity (kWh p.a.) | 2,190 | 1,910 | 1,150 | 4,080 |

5.3.16 Further building design related considerations relate to supporting **ease of future retro-fitting**, including:

- Allowing space for Low and Zero Carbon (LZC) technologies – air source heat pumps must be placed in an accessible outdoor location, ideally in the open air. Similarly, the design of new buildings should include space to accommodate battery systems, inverters, and other hardware (although it is acknowledged that spatial requirements will likely change over time due to technological improvements).
- Allowing access for maintenance and replacement of building services – this issue is more likely to arise in non-domestic buildings with designated plant rooms and ventilation systems. It is important to ensure that the design allows for easy access to all building services (e.g. door dimensions and lift facilities allowing access to plant rooms in the basement or on the roof).

## Conclusion

5.3.17 In **conclusion**, further work should be undertaken to establish masterplanning, urban design and building design policy that applies borough-wide, to specific areas and to specific strategic sites.

5.3.18 In respect of masterplanning and urban design, the need to support walkable neighbourhoods is a key consideration, as is the need to support walking and other 'sustainable transport' modes, as discussed further below under the 'Low carbon transport' heading. It is important to recall the Transport Secretary's recent suggestion that we now face *"a once in a generation opportunity to deliver a lasting transformative change in how we make short journeys in our towns and cities."* There are also links to supporting heat networks and also to various climate change adaptation considerations.

5.3.19 In respect of building design, there is a need to strike a balance between setting design parameters though the Local Plan in order to ensure a suitably strategic approach that reflects the urgency of climate change mitigation, whilst also allowing flexibility to explore wide-ranging building design options at the DM stage, responding to the site-specific context (also latest understanding of technologies etc).

5.3.20 Focusing on Camberley town centre, it is recognised that much work has been completed to date and that work is ongoing. It will be important to ensure that forthcoming work reflects latest understanding of what can and should be achieved, recognising that the national context is evolving rapidly, for example in respect of mobility, heat pumps / heat networks and green infrastructure.

[96] Based on standard 250W / 1.6 $m^2$ panels with a maximum annual output of 850 kWh/kWp, shown with a minimum 300mm gap between the panel and roof edge.

# 5.4 Buildings emissions standards

5.4.1 Set out below is a discussion of building emissions standards for domestic and non-domestic buildings, set out under the following headings:

- Setting performance standards (operational emissions);
- Reducing whole life and embodied (non-operational) emissions;
- Demonstrating compliance;
- Area of site-specific policy;
- Carbon offsetting;
- Conclusions.

5.4.2 By way of further context, it is helpful to recall the following key points:

- Emissions from domestic buildings are the largest source of emissions in the Borough; however, there is very limited or no potential for the Local Plan to influence emissions from **existing buildings**;
- In respect of domestic buildings, the Local Plan will likely need to allocate sites such that the 'standard methodology' derived Local Housing Needs (LHN) figure is met across the plan period. At the current time, Government policy is that LHN should be established using the 2014-based household growth projections, which serves to suggest a need for **332 dwellings per annum (dpa)**; however, this figure is subject to change in light of updated household growth forecasts and/or changes to the Government's standard methodology for calculating LHN. It is also important to note that a significant number of the homes that need to be provided for over the plan period already have planning permission.
- In respect of **non-domestic buildings**, there is likely to be limited or no need to allocate new land for employment or other non-domestic uses over the plan period; however, parts of existing employment sites / areas (e.g. York Town at the western edge of Camberley) may be redeveloped to deliver modern floorspace. Frimley Park Hospital is another built asset of strategic importance, plus mixed-use regeneration of Camberley town centre will be delivered over the plan period, as has been discussed.

## Setting performance standards (operational emissions)

5.4.3 There is a need to consider regulated operational emissions (i.e. emissions associated with the operation of a building that are inherently linked to design) for domestic and non-domestic buildings in turn.

### Domestic buildings

5.4.4 As explained in the recent Future Homes Standard (FHS) consultation document:

*"The Planning and Energy Act 2008 (as amended) allows local planning authorities to set and apply policies in their local plans which require compliance with energy… standards for new homes that exceed the requirements of the Building Regulations. This has been very useful… but has also led to there being inconsistent minimum energy standards being applied across the country.*

*In 2015, the then government set out in a Written Ministerial Statement[97] its expectation that local planning authorities should not set energy… standards for new homes higher than the energy requirements of Level 4 of the Code for Sustainable Homes (equivalent to a 19% improvement on the Part L 2013 standard). Section 43 of the Deregulation Act 2015 [was set to] introduce an amendment to the Planning and Energy Act that restricts local authorities from setting energy standards above Building Regulations levels for new homes, but this amendment has not yet been commenced.*

*We realise that this may have led to confusion and uncertainty for both local planning authorities and home builders. Many local planning authorities are unclear about what powers they have to set their own energy… standards, although a number of local authorities continue to set their own energy performance standards which go beyond the Building Regulations minimum. While most of these adhere to the 19% level set in the 2015 Written Ministerial Statement, some go further."*

[97] Planning Update: Written statement - HCWS488; 25th March 2015

5.4.5 In short, whilst Government's efforts to streamline the planning system in 2015 were successful in respect of certain technical standards for new buildings,[98] this was not the case in respect of building emissions standards, with the Government now revisiting the matter for domestic buildings through the FHS.

5.4.6 Since 2015, numerous Local Plans have set policy requiring a **19% improvement** on the requirement of Part L of the 2013 Building Regulations, while other Local Plans have rounded-up this figure to 20% and others have sought to go further.[99] Another approach is to set a Merton rule style policy whereby a minimum of 10% of the development's heat/power needs are supplied from LZC technologies (which also serves to incentive energy efficiency); however, this approach is increasingly less common, as it becomes increasingly common to set requirements that clearly relate to improvements on Building Regulations. Other Local Plans (e.g. Broxbourne) apply a flexible approach. Tables 5.1 and 5.2 present a review.

5.4.7 Moving forward, two scenarios can be envisaged: one whereby the FHS proposals are implemented, removing the ability of LPAs to set energy performance standards though Local Plans; and another where the FHS standards are not implemented (and local authorities continue to have autonomy).

5.4.8 Focusing on, the latter scenario, a starting point for LPAs considering energy performance standard requirement options is the FHS consultation: *"The first option is a **20% improvement** on carbon dioxide emissions which we expect would be delivered predominantly through an increased fabric standard. This increased fabric standard would typically be achieved through measures such as triple glazing and a waste water heat recovery system. The second option would result in a **31% improvement** on carbon dioxide emissions, which we expect would typically be delivered through a more minor increase to fabric standards, alongside use of low-carbon heating and/or renewables, such as photovoltaic (solar) panels."*

5.4.9 The Government goes on to explain that: *"**Option 2** is our preferred option. It would deliver more carbon savings and result in lower bills for the householder but has higher build costs. We also expect that it would help to prepare supply chains for heat pumps and increase the number of trained installers."*

5.4.10 Both options[100] reflect the principle of following the **energy hierarchy**:

- Eliminate need for heat/power ("be lean")
- Supply heat/power efficiently from renewable and low carbon sources ("be clean and green")
- Offset remaining carbon emissions

5.4.11 Following the energy hierarchy, in the context of building performance standards, is often referred to as taking a **fabric-first** approach. Prioritising better building performance over provision of renewable and low carbon heat/power is a fail-safe approach, as low carbon heat/power systems may not be used effectively by the building occupants or may be removed from a building.

5.4.12 However, the UK Green Building Council (2020)[101] is cautious of being overly stringent in respect of requiring a fabric-first approach on **economic viability** grounds. Their 'Policy Playbook' for Local Plans recommends *"an energy efficiency backstop"* whilst giving "*the market freedom to design for site specific opportunities and challenges"*. The UKGBC review Whole Plan Viability Studies before concluding:

*"A 19% improvement beyond Part L 2013 can be achieved entirely through energy efficiency measures… [which] might cost between £2-3k for a mid or end terraced home up to £5-6k for a detached house. However, for those building to the Part L 2013 notional specification it is possible to achieve a 19% improvement through the use of photovoltaics (PV) or other renewables. A terraced would need around 0.8 kWp of PV with a detached house needing perhaps 1.2 kWp (depending on floor area). The capital costs of adopting a renewables based strategy are likely to be c.£1,500-£2,000 per home."*

[98] The written ministerial statement stated: *"The new system will comprise new additional optional Building Regulations on water and access [e.g. for wheelchair users]… The optional new national technical standards should only be required through any new Local Plan policies if they address a clearly evidenced need, and where their impact on viability has been considered."*
[99] See solarpowerportal.co.uk/news/51_of_councils_beating_out_national_policy_on_building_standards_as_future
[100] Option 2 is flexible, in respect of energy efficiency / high fabric standards; however, under Option 2 there is a clear emphasis on using heat pumps as a central means of achieving the target performance standard (31%), which requires very high energy efficiency / building fabric standards (because heat is delivered at a relatively low temperature).
[101] See ukgbc.org/wp-content/uploads/2020/03/The-Policy-Playbook-v.1.5-March-2020.pdf

### Non-domestic buildings

5.4.13 Whilst Government's intention to create *"certainty and consistency in setting energy efficiency standards"* is clear from the FHS consultation document, and an equivalent consultation dealing with non-domestic buildings is timetabled for 2020, it might prove that Government continues to allow Local Plans to require standards for non-domestic buildings that go beyond Building Regulations. The number of non-domestic schemes dealt with through the planning system is relatively small, hence concerns in respect of "certainty and consistency" are relatively low. It is also noted that non-domestic buildings were not a focus of the proposals to stream-line the planning system presented through the 2015 Written Ministerial Statement.

5.4.14 Some recent Local Plans have set out policies that require a reduction in building-level emissions for non-domestic buildings over-and-above Building Regulations – see Tables 5.1 and 5.2. However, more common is to require application of the **BREEAM** assessment framework, which is well established (and also looks beyond operational regulated emissions, i.e. takes a more holistic approach to emissions).[102] The key question for Local Plan-making is in respect of the types of development for which BREEAM 'very good', 'excellent' or 'outstanding' should be required.

## Reducing whole life and embodied (non-operational) emissions

5.4.15 The energy performance standards set by the Building Regulations deal with operational energy use (e.g. lighting, cooling, heating and hot water);[103] however, a building's true energy performance is also a product of the 'embodied carbon' in building materials and emissions created during the construction process. Furthermore, demolition, refurbishment and retrofitting all create carbon emissions and the potential to minimise these emissions can be considered at the design and construction stages. Such emissions will comprise an increasing proportion of total emissions over a building lifecycle, as operational emissions decrease (due to electrification combined with grid decarbonisation).

5.4.16 Information on the embodied carbon present in building materials is available from a number of sources, for example the Building Research Establishment (BRE) has produced the *Green Guide to Specification* which rates materials from A+ to E for environmental impact including climate change.[104] Best practice guidance has also been developed by RIBA[105] and LETI.[106]

5.4.17 Furthermore, much relevant work is ongoing under in respect of:

- Whole life-cycle approaches;
- Modern methods of construction;
- Site waste management plans.

### Whole life-cycle approaches[107]

5.4.18 The Mayor of London has published guidance to support the preparation of whole life-cycle (WLC) assessments for certain planning applications, with the aim of minimising a development's WLC carbon emissions. The guidance (2020) sets out principles including:

- Reuse and retrofit of existing built structures – "a priority consideration";
- Use recycled or repurposed materials – many of the currently available standard products already include a degree of recycled content, but construction firms should ask questions of suppliers.
- Material selection – the overall life-time carbon footprint of a product can be as much down to its durability as to what it is made of, e.g. bricks may have a high carbon cost in terms of their manufacture, but have an exceptionally long and durable life expectancy;
- Local sourcing - sourcing local materials reduces transport distances and therefore supply chain lengths and has associated local social and economic benefits. Transport type is also highly relevant, e.g. a product transported by ship will have a significantly lower carbon cost per mile than one sent by HGV.

[102] See breeam.com/engage/research-and-development/consultation-engagement/local-government/
[103] N.B. the building regulations only deal with 'regulated' operational emissions. There are also unregulated operational emissions from such things as use of appliances and use of plug in electrical goods.
[104] See bregroup.com/greenguide/podpage.jsp?id=2126
[105] See architecture.com/about/policy/climate-action/2030-climate-challenge
[106] See leti.london/cedg
[107] See london.gov.uk/sites/default/files/wlc_guidance_april_2020.pdf

- Designing for durability and flexibility - a building designed for flexibility can respond with minimum environmental impact to future changing requirements and a changing climate. For example, new buildings for student accommodation should ideally be able to accommodate other types of residential, and potentially even non-residential, uses in case the need for student accommodation falls in the future.
- Disassembly and reuse – designing for future disassembly ensures that products do not become future waste and that they maintain their environmental and economic value.
- Building life expectancy – defining building life expectancy gives guidance to project teams as to the most efficient life expectancy choices for materials and products.
- Minimise operational water use – carbon emissions from water use are largely due to the materials and systems used for its storage and distribution, the energy required to transfer it around the building and the energy required to treat wastewater.
- Building shape and form – compact efficient shapes help minimise both operational and embodied carbon emissions from repair and replacement for a given floor area. This leads to a more efficient building overall, resulting in lower construction and in-use costs.
- Regenerative design – removing $CO_2$ from the atmosphere through materials and systems absorbing it makes a direct contribution to carbon reduction. Examples include unfinished concrete, some carpet products and vegetation.

5.4.19 The guidance describes close links between WLC approaches and the concepts of:

- Circular economy – the circular economy principle focuses on a more efficient use of materials and, in turn, financial efficiency. Principles include optimising recycled content, reuse and retrofit of existing buildings, and designing new buildings for easy disassembly, reuse and retrofit, and recycling. The use of composite materials and products can make future recycling difficult.
- Operational emissions – the guidance recognises that the principle of taking a 'fabric first' approach to minimising operational emissions is generally accepted and serves to highlight the importance of considering the embodied carbon of fabrics. For example, the use of insulation has a clear operational carbon benefit whereas its fabrication has an embodied carbon cost.
- Modern methods of construction – see below. There is also discussion of 'lightweight construction' having merit, including because of reduced need for building foundations and ease of disassembly.

### Modern Methods of Construction[108]

5.4.20 MMC is a broad term that covers a range of offsite manufacturing and onsite techniques that provide alternatives to traditional construction and aim to build homes more quickly and efficiently. Techniques include timber and steel frames, wall panels, volumetric modules and lean construction. Another commonly used term is modular building.

5.4.21 The use of MMC varies significantly from country to country, but the global leaders historically have been Sweden and Japan. Sweden has the highest penetration rate of MMC, with around 45% of all new homes utilising offsite construction. For single-family homes, the figure is close to 80%.

5.4.22 There are a range of potential benefits, including reduced need for labour and the potential to deliver new developments at a very fast pace once offsite construction facilities are in place; however, the focus here is on potential environmental benefits, namely: achieving high energy efficiency standards; and reducing construction waste. Building homes under factory-controlled conditions allows much tighter tolerances to be met, improving energy efficiency and generating significantly less material wastage.

5.4.23 However, at the current time it is not clear that it would be appropriate for a Local Plan, such as that for Surrey Heath, to go beyond encouraging MMC where deemed appropriate by the development industry. There can feasibly be wider links to strategic planning, e.g. an offsite construction facility might be established in a central location from which it can service numerous major development locations within a relatively short radius; however, this is not likely to be a consideration for the Surrey Heath Local Plan.

[108] https://www.savills.com/impacts/new-technology/why-modern-methods-of-construction-are-a-good-fit.html?utm_source=ExactTarget&utm_medium=Email&utm_term=5263460&utm_content=7799839&utm_campaign=Impacts+Launch+Resi+-+RR

### Site Waste Management Plans

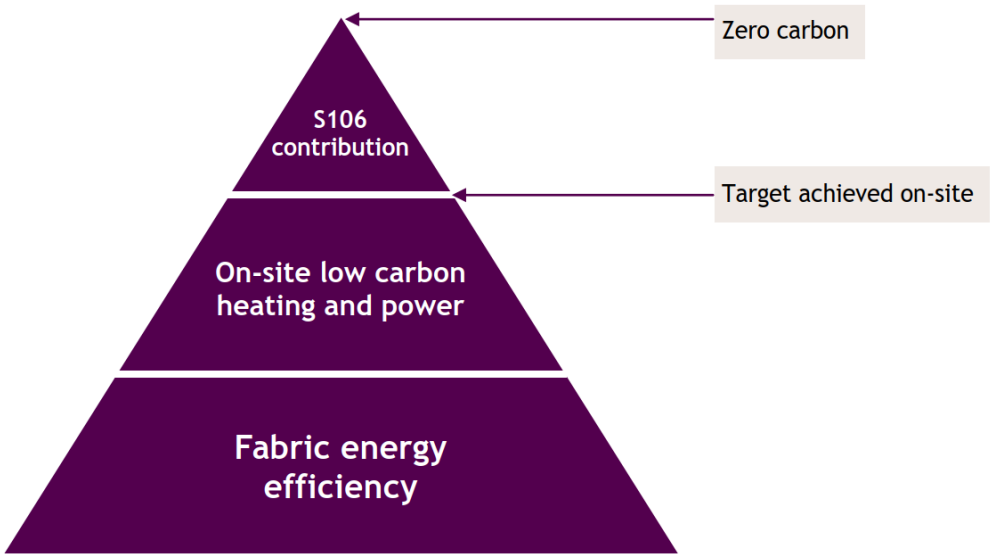
5.4.24 Historically, better construction waste management has been achieved through the use of Site Waste Management Plans (SWMP), which were a requirement for all projects of £300,000 or above (with further additional requirements for projects of £500,000 or above) before the repeal of the Site Waste Management Plans Regulations (2008) in 2013. Since that time some authorities have continued to require SWMPs in certain circumstances. For example, the Draft Guildford Local Plan: Development Management Policies proposes requiring a SWMP for proposals with an estimated cost of £400,000 or above (in addition to a Sustainability Statement that considers matters including embodied carbon).

## Demonstrating compliance

5.4.25 Complying with building emissions standards (of all types) is a complex process for planning applicants, and demonstrating compliance requires submission of detailed information in the form of an 'Energy Statement' and/or 'Sustainability Statement'. It follows that there is typically a need to need to prepare a Supplementary Planning Document (**SPD**) to guide developers through the process, as per Guildford Borough[109] and Reading Borough,[110] amongst others. The Guildford and Reading Borough SPDs cover:

- achieving emissions standards (including, in the case of Reading Borough, achievement of 'net zero' for schemes > 10 homes – see Figure 5.6);
- taking a fabric first approach (e.g. see Figure 5.6);
- other matters relating to following the energy hierarchy, in particular minimising energy requirements through building design, site layout, landscaping and urban form (including through passive solar gain);
- other sustainability matters, including in respect of water efficiency, other climate change adaptation considerations and taking steps to minimise unregulated emissions;[111] and
- guidance on how to prepare information in support of planning applications, with both council's presenting a detailed checklist and requiring submission of both an Energy Statement, dealing with building emissions standards, and a separate Sustainability Statement dealing with other matters.

*Figure 5.6: Reading Borough Council's approach to net zero development*




[109] See guildford.inconsult.uk/consult.ti/CCSDCE20/consultationHome
[110] See reading.gov.uk/planningpolicy
[111] Unregulated emissions mostly result from electricity use by appliances and plug in electrical good, e.g. TVs and computers. They are emissions that are largely unaffected by building design, and almost entirely dependent on individual behaviours. See passivhaustrust.org.uk/UserFiles/File/2019.03.20-Passivhaus%20and%20Zero%20Carbon-Publication%20Version1.2(1).pdf

5.4.26 There is also a need to consider whether to support use of assessment frameworks in place of submitting information in the form of an Energy Statement / Sustainability Statement. Table 5.3 presents a review.

5.4.27 This approach can ease the process for the planning applicant, although there is a need to avoid creating confusion by requiring both a percentage reduction on current Building Regulations and also to require achievement of a certain standard as judged by one of the available accreditation schemes. For example, the Chelmsford Local Plan Inspector's Report (2020) states: *"Requiring that non-residential buildings in excess of 500 sqm of floor area, meet the Building Research Establishment Environmental Assessment Method (BREEAM) (or its successor) 'Very Good' standard, is justified by the evidence… The evidence shows that achieving this BREEAM Very Good standard should secure a carbon dioxide saving of about 15% above the standard building regulations requirement. Notwithstanding this, Policy MP3 also rather confusingly requires that all non-residential development of 1000 sqm or more in size, achieve at least a 10% reduction in carbon dioxide emissions against the standard building regulations. This would be more than achieved by meeting the BREEAM Very Good standard…"* [112]

5.4.28 Furthermore, use of trusted assessment frameworks can address a quite widespread concern regarding the use of energy modelling to demonstrate compliance or exceedance of Building Regulations standards, which is that the real world emissions tend to be significantly higher. For example, research undertaken by Innovate UK, which examined the in-use performance of a selection of low carbon development schemes, found that in-use $CO_2$ emissions from domestic buildings were typically 2-3 times higher than predicted, and those from non-domestic buildings were nearly 4 times higher.[113,114]

5.4.29 Addressing the performance gap between modelled / anticipated and actual emissions requires accurate modelling at the design / planning application stage, as well as monitoring and evaluation of emissions in practice over time. This matter is a focus of the emerging London Plan (Intend to Publish version, 2019), which adds an additional level to the established energy hierarchy (be lean, clean, green), namely "be seen", which deals with reporting on modelling methodologies and monitoring actual emissions over time. The performance gap issue is also a focus of the recent LETI *Climate Emergency Design Guidance*, which proposes monitoring and "data disclosure" as one of the give key principles that must be a focus of work to achieve net zero buildings.[115]

*Figure 5.7: LETI low carbon design principles*[115]


## Area or site-specific policy

5.4.30 Another possibility is to set area or site-specific policy, taking account of development viability. It follows that 'potential to viably achieve emissions reductions' could be applied as a site selection criterion and, in turn, could potentially be a reason for favouring strategic schemes that achieve economies of scale.

5.4.31 Welbourne Garden Village in Fareham Borough (6,000 homes) is a notable example of adopted site-specific policy, with one requirement being that 10% of homes are built to the Passivhaus standard, which sees a 75% reduction in space heating requirements, compared to standard practice for UK new build.

[112] See chelmsford.gov.uk/_resources/assets/inline/full/0/3951296.pdf
[113] See gov.uk/government/publications/low-carbon-homes-best-strategies-and-pitfalls
[114] See gov.uk/government/publications/low-carbon-buildings-best-practices-and-what-to-avoid
[115] See leti.london/cedg

5.4.32 The following is a brief review of some notable local case-study strategic schemes:

- Bracknell Forest – Jealott's Hill (4,000 homes) is allocated in the emerging Local Plan, with policy requiring: *"Measures to ensure zero net carbon and sustainable waste management"*.[116]
- Hart – the Local Plan allocates Hartland Village (1,500 homes), but the policy does not set any requirements in respect of emissions; the Sustainability Statement submitted alongside the approved planning application explains that the scheme "*is expected to achieve compliance with the requirements of the Building Regulations Part L1A (2013) through passive design and energy efficiency measures… The potential for incorporation of renewable energy systems will be considered in future development phases as part of the detailed design of these. It is currently expected this could lead to a theoretical reduction in carbon emissions of up to 10%. However, as the Proposed Development is targeting to achieve compliance with Part L 2013 from passive design and energy efficiency alone… low or zero carbon technologies will only be implemented… should this become necessary to meet targets..."*[117]
- Runnymede - Longcross Garden Village (1,700 homes) is allocated in the emerging Local Plan, with policy requiring: *"Maximise opportunities to reduce the use of natural resources through a fabric-first approach, potentially including passive solar design, passive cooling and… water efficiency…"*[118]
- Wokingham – the Borough has been progressing four Strategic Growth Locations (SDLs) since these sites were allocated in the Core Strategy (2010);[119] with the emerging Local Plan presenting policy for all four on the basis that they are all still building-out. None of the policies reference emissions and, in practice, deliverability has proved challenging which has limited what can be achieved. The most recent planning application for a major scheme (South of Wokingham Phase 2b; 1,500 homes) proposes only *"sustainable building construction techniques in line with current Building Regulations."*[120] However, the Borough is looking to move-forward on a stronger footing through the Local Plan Update, which proposes allocation of "carbon neutral" Grazeley Garden Town (15,000 homes).[121]

## Carbon offsetting

5.4.33 Depending on the type of development in question, it may not be feasible to deliver the requisite level of $CO_2$ emissions reduction onsite, and this will always be the case in respect of 'net zero' requirements.

5.4.34 In such situations there is a need to consider directing financial contributions *in lieu* towards a carbon offset fund. The money can then be used to pay for interventions off-site that would result in an equivalent amount of $CO_2$ being avoided (e.g. through energy efficiency measures or LZC projects) or removed from the atmosphere (e.g. through woodland creation). This can be an effective approach; however, there is a need to ensure additionality, i.e. ensure that the intervention would not have happened in any case.

5.4.35 The London Plan approach to offsetting is a well-known example, with payments currently based on a carbon price of £60 per tonne of $CO_2$ (the new draft London Plan suggests £95/t$CO_2$) and, importantly, the fund must be spent on offsetting projects elsewhere in the respective borough.[122] The Milton Keynes approach to offsetting (see Table 5.2) similarly sets requires that funds are spent on local initiatives.

## Conclusion

5.4.36 Requiring that new build housing achieves regulated operational emissions standards over-and-above Building Regulations is an effective decarbonisation strategy, more so than setting Merton Rule style policies and significantly more so than only looking to set soft policy requirements open to interpretation.

[116] See bracknell-forest.gov.uk/planning-and-building-control/planning/planning-policy/development-plan/draft-bracknell-forest-local-plan/
[117] N.B. the plan is not yet adopted; see hart.gov.uk/local-plan
[118] See wokingham.gov.uk/planning-policy/planning-policy-information/local-plan-update/
[119] See wokingham.gov.uk/major-developments/
[120] See publicaccess.wokingham.gov.uk/NorthgatePublicDocs/00461608.pdf
[121] See runnymede.gov.uk/article/13869/Runnymede-2030-Local-Plan-Emerging-
[122] GLA, *'Carbon Offset Funds: Guidance for London's Local Planning Authorities'* (2018). Available at: https://www.london.gov.uk/sites/default/files/carbon_offsett_funds_guidance_2018.pdf

5.4.37 There is much variation nationally (and locally) in respect of the precise approach to achieving emissions standards, which can create confusion and uncertainty for the development industry. Implementing policies is invariably a complex undertaking, such that there is a need to set detailed guidance through an SPD, and/or support use of an established assessment framework (for example Passivhaus, which can help to avoid a 'performance gap' between design intent and emissions in practice).

5.4.38 For Surrey Heath there is the potential to viably require operational emissions standards over-and-above current Building Regulations, potentially in-line with Option 2 from the Future Homes Standard consultation (2019), which involves placing a strong emphasis on minimising building-level emissions through high efficiency / fabric standards first-and-foremost, ahead of onsite LZC heat and/or power generation. However, the Government's analysis of consultation responses is still awaited.

5.4.39 Subject to viability, there could also be the potential to explore setting requirements for 'net zero' developments, as per the approach being pioneered in major urban areas nationally, including London and Reading, and which involves setting up a carbon offsetting fund.[123] In this respect, it is important to note that understanding of what net zero means in practice is evolving (taking account of whole life and embodied emission, and unregulated emissions, e.g. associated with plug in electrical goods).[124]

5.4.40 One possibility for the Surrey Heath Local Plan is to explore a phased approach to setting increasingly stringent standards, as per the Oxford Local Plan, an approach that was recently endorsed by a Planning Inspector.[125] There will be particular opportunities where development viability is highest / deliverability is least challenging, but there could still be a need to compromise given competing priorities.

5.4.41 However, there is firstly a need to learn the outcomes of the Government's recent Future Homes Standard consultation, which proposed a standardised national approach.

5.4.42 In respect of non-domestic buildings, there is clear potential to set policy that requires achievement of a certain BREEAM standard, and potentially BREEAM Excellent, subject to viability testing.

5.4.43 Finally, regardless of the outcome of the Future Homes Standard consultation, there is a need to explore setting policy that is supportive of minimising embodied carbon and other steps to minimise emissions across the whole life-cycle of development, recalling that Building Regulations deal only with operational emissions. Beyond setting development management policy, this can also be a matter of relevance to spatial strategy and site selection, for example sites that would involve reuse of existing buildings.

[123] See offsetting discussion here (para 6.3): london.gov.uk/sites/default/files/gla_energy_assessment_guidance_april_2020.pdf
[124] E.g. see ukgbc.org/wp-content/uploads/2019/04/Net-Zero-Carbon-Buildings-A-framework-definition.pdf and passivhaustrust.org.uk/competitions_and_campaigns/passivhaus-and-zero-carbon/
[125] See paragraph 109 at: oxford.gov.uk/downloads/file/7288/inspectors_report_-_oxford_local_plan_2036

*Table 5.1: Review of policies prepared by neighbouring authorities*

| Local Plan | Domestic buildings | | | Non-domestic buildings |
|---|---|---|---|---|
| | Exceed building regs? | Merton rule? | Other (including example 'soft' policy requirements) | |
| Bracknell Forest[126] | Zero carbon for major<br>19% reduction for minor | - | Commits to SPD | BREEAM excellent |
| Guildford[127] | 20% reduction | - | Various other requirements, including "*measures that enable sustainable lifestyles for the occupants*", which aims to address non-regulated electricity use; an SPD is in preparation, as is a Development Management Policies Plan. | 20% reduction (not retail in Guildford TC) |
| Hart[128] | - | - | Reduce *"energy consumption through sustainable approaches to building design and layout, such as through the use of low-impact materials and high energy efficiency"*; incorporate renewable energy where appropriate. | - |
| Reading[129] | Zero carbon for major (10+ homes)<br>19% reduction for minor | - | The adopted SPD explains that major schemes should ideally achieve zero carbon on-site, but if this is not achievable then a minimum of 35% should be achieved onsite, with residual emissions offset.[130] | BREEAM excellent for major<br>BREEAM very good for minor |
| Runnymede[131] | | Yes where > 1,000m2 | *"Maximise opportunities for passive solar gain and passive cooling through the orientation and layout of development"*. | |
| Rushmoor[132] | - | - | Demonstrate *"sustainable construction standards and techniques."* | BREEAM very good where > 1,000m2 |
| Wokingham[133] | Zero carbon for major<br>19% reduction for minor | | *"Implement the Energy Hierarchy… by prioritising a 'fabric first' approach and passive design and landscaping measures to minimise energy demand for heating, lighting and cooling; Appropriately integrate solar gain, natural ventilation or ventilation with heat recovery..."* | BREEAM excellent for major<br>BREEAM very good for minor |
| Windsor and Maidenhead[134] | - | - | Incorporate *"sustainable design and construction which: minimises energy demand; maximises energy efficiency."* | |

[126] N.B. the plan has not been examined; see bracknell-forest.gov.uk/planning-and-building-control/planning/planning-policy/development-plan/draft-bracknell-forest-local-plan/
[127] See guildford.gov.uk/localplan
[128] N.B. the plan is not yet adopted; see hart.gov.uk/local-plan
[129] See reading.gov.uk/newlocalplan
[130] *"If [zero carbon onsite] is not achievable… a Section 106 contribution of £1,800 per remaining tonne towards carbon offsetting within the Borough (calculated as £60/tonne over a 30 year period)."*
[131] See runnymede.gov.uk/article/13869/Runnymede-2030-Local-Plan-Emerging
[132] See rushmoor.gov.uk/rushmoorlocalplan
[133] N.B. the plan has not been examined; see wokingham.gov.uk/planning-policy/planning-policy-information/local-plan-update/
[134] N.B. the plan has not been examined; see rbwm.gov.uk/info/201026/borough_local_plan/1350/examination

*Table 5.2: Review of policies from select notable Local Plans nationally*

| Local Plan | Domestic buildings | | | Non-domestic buildings |
|---|---|---|---|---|
| | Exceed building regs? | Merton rule? | Other (including example 'soft' policy requirements) | |
| Bedford[135] | 10% reduction where < 10 homes<br>19% reduction where > 10 homes | - | - | 10% reduction |
| Bristol[136] | 35% reduction with 10% through efficiency.<br>After applying on site measures, achieve *"a 100% reduction in… remaining regulated and unregulated emissions through… offsetting."* | - | BREEAM Communities excellent for schemes > 200 homes<br>Support use of Passivhaus as method to demonstrate standards. | BREEAM excellent for major |
| Broxbourne[137] | A flexible policy ("*All development must maximise the use of sustainable construction methods and materials. Proposals which can demonstrate… adaptability… to the challenges of climate change will be welcomed*"), including on the basis that: *"Most sustainable construction requirements are now addressed through the Building Regulations."* | | | |
| Eastleigh[138] | 19% reduction through efficiency | - | Various including larger developments to deliver at least 1% of all residential units which achieve full Passivhaus certification. | BREEAM excellent or 'very good' including a 15% emissions reduction |
| Ipswich[139] | 19% reduction | All new build development of 10 or more dwellings or in excess of 1,000 sq. m of other residential or non-residential floorspace shall provide at least 15% of their energy requirements from decentralised and renewable or low-carbon sources. | | |
| Milton Keynes[140] | 19% reduction; plus on-site renewable energy generation, or connection to a renewable or low carbon community energy scheme, that contributes to a further 20% reduction; plus offset residual through local initiatives. | | Prioritise fabric first, passive design and landscaping measures to minimise energy demand for heating, lighting and cooling | BREEAM outstanding where > 1,000m2 |
| Oxford[141] | 40% reduction (25% through on-site generation)<br>50% reduction from 2026<br>Zero Carbon from 2030. | | - | BREEAM excellent where > 1,000m2 plus a 40% emissions reduction, increasing to 50% reduction from 2026. |
| Shropshire[142] | 19% reduction where > 10 homes | Yes | A strong overarching policy on climate change, and then a detailed policy. | BREEAM excellent where > 1,000m2 |

[135] See bedford.gov.uk/planning-and-building/planning-policy-its-purpose/local-plan/
[136] N.B. the plan has not been examined; see bristol.gov.uk/planning-and-building-regulations/local-plan-review
[137] See broxbourne.gov.uk/resident-planning-and-building-planning-policy/local-plan-2018-2033 (N.B. adopted June 2020)
[138] N.B. the plan is not yet adopted; see eastleigh.gov.uk/media/3484/final-local-plan-document-june-2018-print.pdf
[139] .B. the plan has not been examined; see ipswich.gov.uk/services/emerging-ipswich-local-plan-2018-2036
[140] See milton-keynes.gov.uk/planning-and-building/plan-mk
[141] N.B. the plan is not yet adopted; see oxford.gov.uk/info/20264/local_plan/1311/local_plan_2016-2036
[142] N.B. the plan has not been examined; see shropshire.gov.uk/committee-services/documents/s24934/Appendix%201.%20Pre-Submission%20Draft%20Local%20Plan.pdf

*Table 5.3: Comparison of how select building design standards address $CO_2$ emissions*

| | Part L 2013 | Future Homes Standard | | BREEAM 'Outstanding' | Home Quality Mark (HQM) | Passivhaus |
|---|---|---|---|---|---|---|
| | | Option 1 | Option 2 | | | |
| Relevant building types | Domestic and non-domestic | Domestic | Domestic | Non-domestic | Domestic | Domestic and non-domestic |
| Energy scope | Regulated | | | Core requirements relate to regulated energy operational energy, but additional credits can be achieved for unregulated. | | Regulated and unregulated |
| Required improvement on Building Regs | - | 20% | 31% | 40% | | Very low emissions |
| Fabric / efficiency standard? | Yes | Yes, target met through efficiency | Flexible, but 'fabric first' expectation | No, BREEAM and HQM are flexible | | Yes, Passivhaus is focused on fabric/efficiency standards |
| Renewable energy requirement? | No | No | No, but typically necessary | | | No, but typically necessary |

## 5.5 Low carbon heating

5.5.1 As discussed, the Government has proposed *"mandating the end of fossil fuel heating systems in new homes from 2025"*, which also aligns with the Future Homes Standard proposals. There are strong arguments for ending the installation of new boilers immediately; for example, a recent study found that the lifetime carbon emissions (over 60 years) of a house built with a gas boiler in 2020 and then retrofitted with a heat pump in 2030 would be around three times higher than if a heat pump was fitted at the outset.[143]

5.5.2 The roll-out of heat pumps will equate to an 'electrification of heating', with wide ranging implications. The key issue/opportunity to discuss here is the role of the Local Plan in respect of supporting one or more **heat networks**, that is a network that connects a number of properties to a strategic heat source. There are a very wide range of strategic heat sources that can be used, but typically modern (fifth generation) heat networks draw upon low temperature heat sources with temperature then raised by heat pumps.

5.5.3 Support for heat networks, or 'district heating' schemes, should be a prominent spatial planning consideration, with a need to assess competing spatial strategy options in respect of:

- Proximity of growth to an existing heat network (although there are none currently in Surrey Heath) a strategic **heat source** (as discussed above) and/or a strategic source of **heat demand**.
- Support for concentrations of growth that will achieve the requisite **density of heat demand**, and also achieve **economies of scale** that can help to make delivery of costly heat networks viable;[144] and
- Support for mixes of uses in any given area such that there is a relatively **smooth heat demand profile** (also cooling) over time and, in particular, across the day.

5.5.4 In the Surrey Heath context, the regeneration of **Camberley town centre** presents a major opportunity to deliver low carbon heating and cooling to thousands of residents and many businesses, but there is a risk of this opportunity being missed, with no reference to low carbon heating (or power) in the Masterplan and Urban Realm SPD (2015). There is a need to better understand the constraints and opportunities that exist, to include exploration of potential heat sources (to include the extensive areas of open space and open water to the north, associated with the Royal Military Academy)[145] and strategic sources of heat demand (to include the planned new leisure centre, which will include a heated swimming pool).[146]

5.5.5 There may also be opportunities associated with one or more **strategic growth locations** identified as options for the Local Plan, noting that the committed (indeed, near completed) strategic site at Princess Royal Barracks does not include a heat network, nor is one proposed for nearby Longcross Garden Village in Runnymede Borough (despite proximity to a major employment growth location). The Yorktown Area stands out as a locational opportunity given industrial and other employment uses, a Wastewater Treatment Works and the River Blackwater;[147] however, there no reason to suggest that strategic redevelopment is an option for the Local Plan. Frimley Park Hospital is another major source of heat demand but, again, there is no reason to suggest that redevelopment or strategic growth nearby is an option. The Council could work with the Ministry of Defence to explore spatial opportunities, and opportunities associated with HM Prison Coldingley could also be explored.

5.5.6 Regardless of whether it is possible to realise heat network opportunities through the allocation of sites / spatial strategy, it is standard practice to include area-wide development management policy in Local Plans that seeks to ensure that consideration is given to heat networks at the development management / planning application stage. The following is a brief review of Local Plan policies:

- Bracknell, Hart and Windsor and Maidenhead and Wokingham – support proposals provided that specified adverse impacts are avoided;
- Guildford Local Plan – requires: "Proposals for development within Heat Priority Areas… and all sufficiently large or intensive developments must demonstrate that… CHP has been… [considered]."

[143] Currie Brown and AECOM on behalf of the Committee on Climate Change, *'The costs and benefits of tighter standards for new buildings'* (2019). Available at: https://www.theccc.org.uk/wp-content/uploads/2019/07/The-costs-and-benefits-of-tighter-standards-for-new-buildings-Currie-Brown-and-AECOM.pdf
[144] See eti.co.uk/insights/district-heat-networks-in-the-uk-potential-barriers-and-opportunities
[145] The recent Powering Parks study (see wearepossible.org/latest-news/powering-parks) found 31 ha of public parks and green spaces in Surrey Heath potentially suitable for a ground source heat array, with the potential to supply 7mw of heat.
[146] See surreyheath.gov.uk/news/plans-announced-brand-new-multi-million-pound-leisure-venue
[147] See one recent example of utilising a Wastewater Treatment Works as a strategic heat source: cmscoms.com/?p=20713

- Runnymede – "Development proposing 10,000sqm-50,000sqm of net additional floorspace should consider whether connection to existing renewable, low-carbon or decentralised energy networks is possible… development proposing more than 50,000sqm of net additional floorspace will be expected to provide onsite, new decentralised networks of renewable or low carbon energy sources within the development proposal, to exceed the 10% requirement of their own needs [see Table 5.1]…"
- Reading – "Any development of more than 20 dwellings and/ or non-residential development of over 1,000 sq m shall consider the inclusion of decentralised energy provision, within the site, unless it can be demonstrated that the scheme is not suitable, feasible or viable for this form of energy provision."

5.5.7 A clear limitation to relying on DM policy to deliver heat networks is that applicants will very often be able to demonstrate that delivery of a heat network is not viable because the locational opportunities do not exist, or because costs are prohibitive giving other competing funding priorities. It is noted that the Deepcut SPD (2011) stated: *"The Council would support the use of combined Heat and Power schemes (CHP)… and developers of the PRB site should explore the viability of developing such a system."*

5.5.8 In this respect Guildford Borough's approach of defining Heat Priority Areas is of interest as, within these areas, the 'bar is raised' in respect of the evidence that must be provided by applicants. It is recommended that Heat Priority Areas are defined in Surrey Heath for this reason partly because definition of Heat Priority Areas will serve to help inform spatial strategy and site selection. Slightly further afield, Basingstoke and Deane Borough Council recently prepared a detailed study to identify Heat Priority Areas, which led to the identification of particular opportunities that are now being explored through the Local Plan.[148]

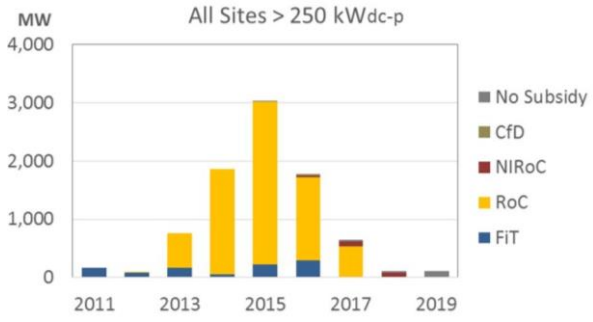
5.5.9 In **conclusion**, realising Government ambitions for low carbon heating through support for heat networks is a primary decarbonisation opportunity for Local Plans. Whilst setting robust development management policy is important, the primary opportunity is associated with establishing spatial strategy and selecting sites for allocation. The focus should be on heat networks utilising low temperature heat sources / heat pumps, with CHP decreasingly seen as a low carbon option as the national electricity grid decarbonises.

## 5.6 Renewable power

5.6.1 The focus here can reasonably be on smaller scale renewables installations with a generating capacity under 5 Megawatts (MW) that qualify for the Smart Export Guarantee (SEG),[149] which is the successor to the Feed in Tariff. With regards to larger scale renewable energy generation schemes:

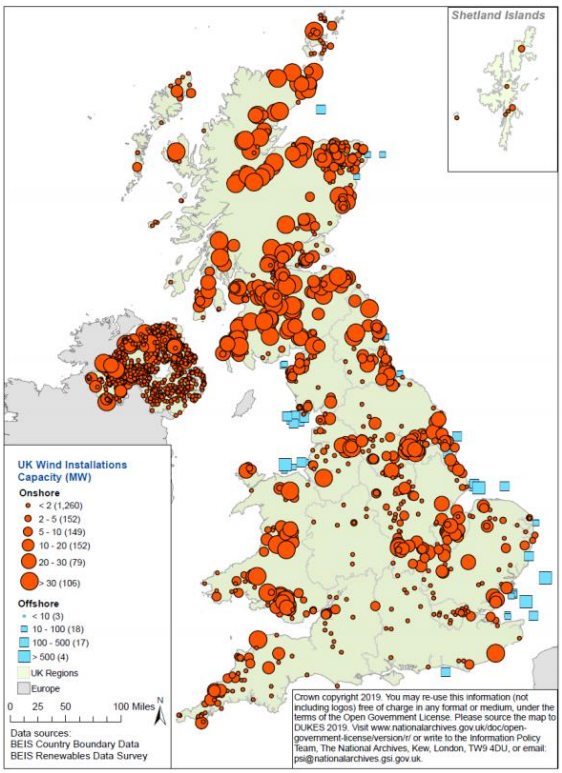
- Solar PV – whilst there was a boom in large scale solar farms following the introduction of Government subsidy schemes in 2011 (in 2010 the UK did not have any large-scale solar farms), the subsidies have now been removed and the roll-out of solar farms has drastically reduced – see Figure 5.8. Whilst there is evidence of the market beginning to pick back up again as costs reduce,[150] and there are notable recent examples of subsidy-free solar farms,[151] the likelihood is that this is not a matter for the Surrey Heath Local Plan, also noting the environmental constraints present across the Borough.[152]
- Wind - there are no schemes larger than 5MW in the vicinity of Surrey Heath – see Figure 5.9.

*Figure 5.8: UK annual delivery of ground mounted solar PV*




[148] See basingstoke.gov.uk/heat-networks-study
[149] See ofgem.gov.uk/environmental-programmes/smart-export-guarantee-seg
[150] See solarpowerportal.co.uk/news/renewables_planning_applications_grow_by_75_in_three_years
[151] For example https://www.bbc.co.uk/news/uk-england-kent-52841066; https://www.solarpowerportal.co.uk/news/nesf_lauds_switch_on_of_uks_largest_subsidy_free_solar_site; and more locally solarpowerportal.co.uk/news/anesco_energises_12mw_subsidy_free_bumpers_solar_farm
[152] See solarpowerportal.co.uk/blogs/understanding_the_uks_8.5gw_of_completed_large_scale_solar_farms

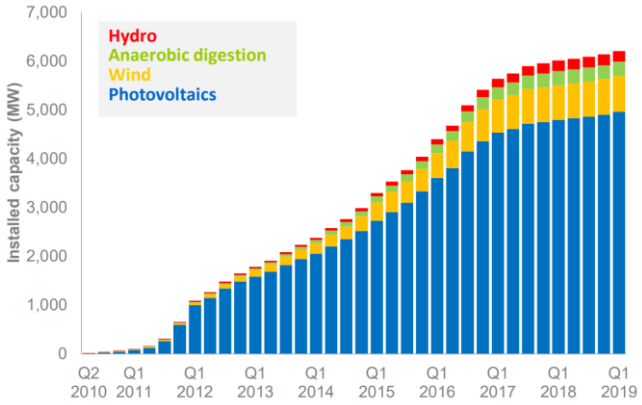
*Figure 5.9: UK onshore and offshore wind capacity*




5.6.2 As can be seen from Figure 5.10, schemes below 5MW capacity generate power from:

- **Solar photovoltaics (PV)** – this dominates the picture with around 5,000MW installed capacity nationally in 2019 and, whilst a proportion of this capacity will be in the form of household level PV (less relevant to the discussion here), a significant proportion will be in the form of large PV arrays;
- **Wind** – there are only a small number of wind turbines in the vicinity of Surrey Heath and all have a capacity below 2MW (see Figure 5.5); however, it is noted that a recent (February 2020)[153] Government announcement should increase the potential for new schemes to come forward.
- **Anaerobic digestion** – planning for AD facilities is undertaken by the County Council;[154]
- **Hydro** – there are several hydro schemes on the River Thames, including one at Windsor and another planned at Reading;[155] however, all use the use the change in river level at a weir to drive one or more Archimedes Screw turbines; there are no weirs along the River Blackwater in Surrey Heath.

*Figure 5.10: Renewables generation qualifying for the FiT, 2010 - 2019*




[153] See theccc.org.uk/2020/03/03/ccc-welcomes-government-re-commitment-to-onshore-wind-and-solar; also see
[154] The Surrey Minerals and Waste Local Plan 2019-2033 was submitted for examination in April 2019 (see surreycc.gov.uk/land-planning-and-development/minerals-and-waste/waste-plan/2019-2033. The plan does not propose the allocation of any new AD facilities; however, this is perhaps unsurprising given that the Surrey Ecopark is currently under construction (see ecoparksurrey.uk/about/inside-the-eco-park/food-waste).
[155] See /hydro.readinguk.org/

5.6.3 However, 5MW schemes are large, strategic schemes for the purposes of preparing a Local Plan, and this is certainly the case in the Surrey Heath context. In 2018, Surrey Heath had a total of 3.9MW of installed capacity, of which 3MW came from PV spread across 750 sites.[156]

5.6.4 It follows that the focus of the Local Plan should be primarily on supporting schemes of a scale suited to delivery as a **community energy** scheme. The NPPF includes specific support for community energy schemes at para 152, which states: *"Local planning authorities should support community-led initiatives for renewable and low carbon energy, including developments outside areas identified in local plans or other strategic policies that are being taken forward through neighbourhood planning."* There is also dedicated section within Government's online Planning Practice Guidance (PPG).[157]

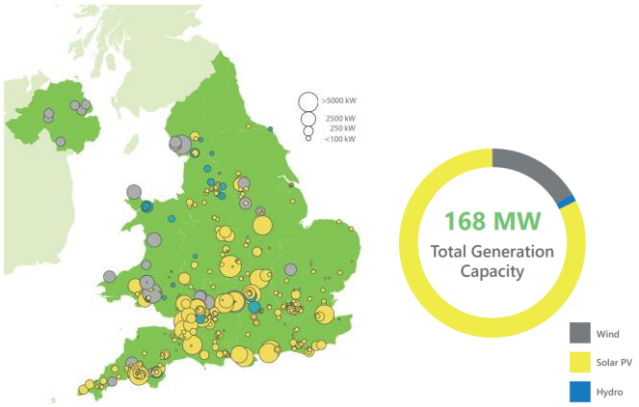
5.6.5 There is no single definition of community energy; however, from a planning perspective, it is fair to highlight that negative impacts of schemes (e.g. visual impacts of solar) are offset by benefits to the local community, including financial returns for those who invest in shares (although the opportunity to invest is typically not limited to the local community)[158] and benefits from profits reinvested locally. In 2018, community energy schemes led to £978,000 invested in local communities nationally[159] and, as of March 2020, community solar had provided £100,000 for Covid-19 support nationally.[160]

5.6.6 The contribution of community energy schemes to the achievement of national renewables targets is not to be over-stated, with a total installed capacity in England of 168MW, compared to a total installed renewables capacity of around 28,000 MW.[161] However, there is potential for growth in this sector and a role for Local Plans through spatial strategy (community energy can be integrated at the outset where strategic developments support development of new communities), the allocation of sites for schemes and through policy support for 'windfall' schemes including through Neighbourhood Plans.

5.6.7 Furthermore, there is strong take-up in the South East of England (see Figure 5.11), for example:[162]

- Maidenhead - MaidEnergy Ltd works by finding schools and community buildings that are interested in benefitting from solar panels and managing the installation and all ongoing running of the scheme. To date, panels have been installed at four sites with 153 local investors, and shares were recently sold (£100) to raise £70,000 to deliver 106kW of solar panels on the roof of a new leisure centre.
- Reading – planning permission has been granted to a community-led organisation for a power plant comprising two Archimedes screw hydro turbines together rated at 46 kW of usable power output.
- Hampshire - the Hampshire Renewable Energy Co-operative first sought to deliver a 28MW wind farm, with support from 2,800 local people; however, planning permission was refused. The group has since focused on PV, with one ground mounted scheme and several roof mounted schemes.
- Oxfordshire - the five turbine Westmill Wind Farm Co-op was the first 100% community owned onshore wind farm to be built in the south of England when brought online in 2008 and, in 2012, over £1m was raised to deliver a 5MW PV array (20,000 panels across 12ha) on the same site.

*Figure 5.11: Community energy schemes in England (2018)*




[156] See https://www.gov.uk/government/statistics/regional-renewable-statistics
[157] See gov.uk/guidance/community-energy
[158] See communityshares.org.uk/find-out-more/what-are-community-shares
[159] See communityenergyengland.org/pages/state-of-the-sector-report-2019
[160] See solarpowerportal.co.uk/news/community_solar_provides_100000_for_local_covid_19_support
[161] See gov.uk/government/statistics/regional-renewable-statistics
[162] See hub.communityenergyengland.org; maidenergy.coop; hydro.readinguk.org; hampshire-energy.coop; westmill.coop

### Implications of Green Belt

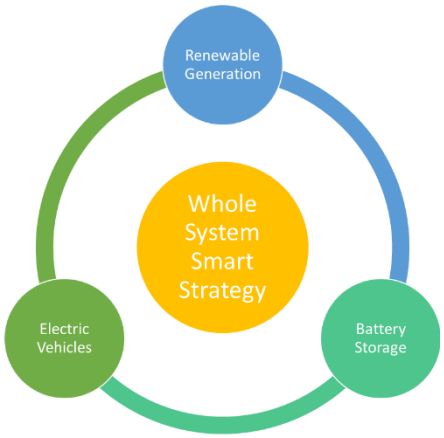
5.6.8 The delivery of wind turbines and solar farms is made more complicated in Surrey Heath by the Green Belt designation. Green Belt policy is set nationally and restricts development in Green Belt areas, defining many types of development as "inappropriate". Regarding renewable energy, paragraph 147 of the NPPF states:

*"When located in the Green Belt, elements of many renewable energy projects will comprise inappropriate development. In such cases developers will need to demonstrate very special circumstances if projects are to proceed. Such very special circumstances may include the wider environmental benefits associated with increased production of energy from renewable sources."*

*5.6.9* Neighbouring Guildford Borough, where all available land also falls within the Green Belt, is currently exploring this matter through their Local Plan, with an initial draft version of the plan explaining that the preferred policy approach will be to *"allocate one or more sites for renewable and low carbon energy development in appropriate locations where visual and other impacts will be minimised and where energy potential is good."* This is on the basis that *"some forms of development are not necessarily inappropriate in the Green Belt, such as the re-use of buildings and change of use of land, provided there is no conflict with the purposes of the Green Belt and openness is preserved."*

### Energy balancing and smart systems

5.6.10 It is increasingly recognised that decentralised renewable power generation must be delivered alongside decentralised battery storage, including through EVs, in order to balance supply and demand over the course of the day, and from day to day (e.g. both wind and solar generation are affected by the weather). This can be described as a Whole System Smart Strategy and will also be a critical tool in support of the electrification of heating (i.e. heat pumps).




5.6.11 Such systems can be implemented at a range of scales, but of greatest relevant to the Local Plan is the community scale, where MW-scale battery systems are connected to large renewable energy assets (e.g. rooftop solar arrays on public or industrial buildings) and integrated with rapid charge hubs for EVs and other power loads (e.g. street lighting).

### Conclusions on renewable power

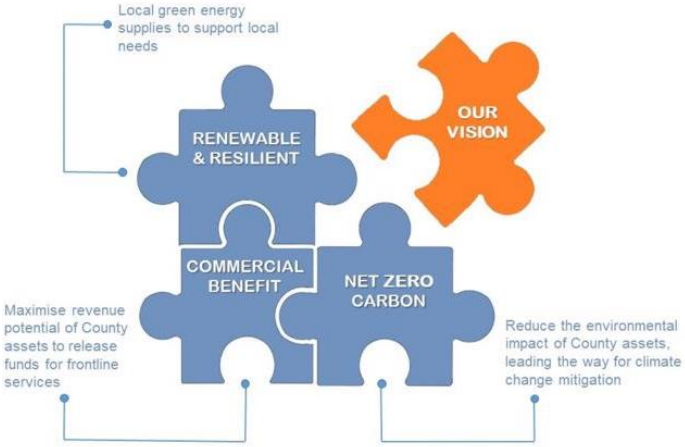
5.6.12 Whilst the constrained nature of Surrey Heath Borough may well mean that it is a challenge to identify one or more sites, or areas of search, suitable for renewable energy it could, however prove appropriate to explore spatial constraints and opportunities nonetheless, particularly in respect of the opportunity to deliver one or more new solar PV arrays, ideally also with battery storage (although Green Belt is a constraint). The greatest opportunity is likely to be in respect of identifying sites/areas suitable for schemes that would be taken forward as a community energy scheme, in accordance with paragraph 152 of the NPPF, and noting the increasing popularity of community-led schemes, but the potential for schemes to be taken forward via other models could also be explored (see further discussion below regarding the potential for Council-led renewables schemes). Regardless of whether or not it proves possible to identify one or more sites/areas, there will be a need to develop tailored development management policy to guide neighbourhood plan-making and planning applications, including in respect of any windfall schemes that might come forward over the plan period.

## A note on the Council's leadership role

5.6.13 It is becoming increasingly common for local authorities to take an active role in respect of increasing renewable power generation in their area, going beyond establishing a policy framework to actively raising and investing funds, convening stakeholders and market actors, communicating ambitions to the public and putting in place management organisations. This can align with council climate change mitigation initiatives, including in respect of, low carbon heating, transport and retrofitting.

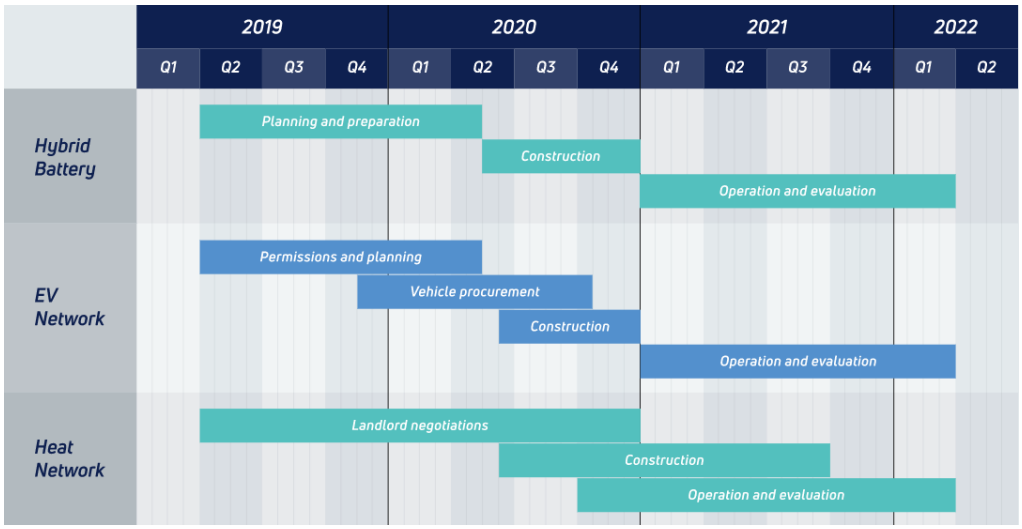
5.6.14 Cambridgeshire County Council is taking a lead nationally, beginning in 2012 with a grant used to develop a framework for investing into energy infrastructure, to upskill staff and understand the risks and issues in developing energy projects. There has been a focus on solar, with a 12MW solar farm that started generating in 2016 and has delivered over £350,000 per annum net revenue to the Council; an early solar carport at a park and ride site gaining planning permission in 2017 (solar carports have subsequently become a popular choice for local authority investment – see below); plans for a new 2.5MW park and ride solar carport with battery storage; plans for two solar-plus-storage projects on existing landfill sites; and plans for a 29MW solar farm.[163] The County Council is also investing £11 million in a schools energy programme, and is working with a rural community to deliver a new heat network.[164]

*Figure 5.12: The Cambridgeshire strategy*




5.6.15 Oxford City Council is another leading authority, establishing the 3-year £41 million Energy Superhub Oxford (ESO) project in 2019.[165] Central to the project is delivery of *"the world's largest ever hybrid energy storage system"* aimed at meeting the complex needs of rapid EV charging and the electrification of heating.[166] Alongside this there is a focus on delivering rapid EV charging points and 300 homes will soon be connected to *"shoebox ground source heat pumps with smart controls and a time of use tariff to optimise heat production for cost and carbon savings."* The University of Oxford will monitor the project and then build a computer model to simulate a scaled-up system.

*Figure 5.13: The Energy Superhub Oxford Project Plan*




[163] See solarpowerportal.co.uk/news/cambridgeshire_county_council_plans_for_29mw_solar_development
[164] See mlei.co.uk/projects/swaffham-prior-community-heat
[165] See energysuperhuboxford.org/oxford-kickstarts-ev-revolution-with-energy-superhub-oxford/
[166] This hybrid system will combine the high-power capabilities of a lithium-ion battery with the heavy cycling, non-degrading characteristics of vanadium redox flow technology to meet the complex demands of multiple energy applications.

5.6.16 Other leading local authorities include:

- Ashford Borough – plans to develop a 9MW solar farm on Council land, which is forecast to generate around £7 million over a 25-year life expectancy. Having received cabinet approval, the Council will now conduct a local consultation, which will be followed by a formal planning application.[167]
- Bristol City Council – recently partnered with a local energy supplier to launch a search for organisations willing to invest in a joint venture entitled Bristol City Leap, which will help deliver a net zero the city.[168]
- Leicestershire County Council – has proposed a 10MW solar farm, the initial phase of which is expected to cost £14 million and is expected to generate more than £830,000 a year in returns.[169]
- Newport City Council – is working in partnership to install up to 2MW of rooftop solar PV across 21 sites in the city, which will deliver a 20-fold increase in the amount of renewables installed on Council buildings over a period of months. Project partner Egni Co-op has raised £1.4 million through a share offer.[170]
- Northumberland Council – is delivering a 400kw solar carport, with battery storage, at the County Hall. The Council has applied for a grant through the European Regional Development Fund which would fund half of the £2.3 million project with the other half will be paid for by the Council.[171]
- West of England Combined Authority - is offering £500,000 to projects of up to 5MW through the West of England Low Carbon Challenge Fund, as part of a wider £1.7 million EU-backed fund.[172]
- West Suffolk - a 12.4MW Council-owned solar farm has generated £4 million income in three years (although this is partly from Renewable Obligation Certificates, ROCs, a subsidy that is no longer available).[173]
- Wokingham Borough – is to install solar on schools, libraries, leisure centres and other council-owned buildings, supporting the Council's goal of being carbon neutral by 2030.[174]
- York City Council – has proposed a 400kw solar carport, powering a mix of 160kW and 7kW electric vehicle (EV) chargers. The carport is the first in the HyperHubs element of the Go Ultra Low York Programme, which will see multiple hubs located around the outer ring road of York, with the aim of providing charging in the key traffic flow corridor and accelerating the uptake of EVs in the city.[175]

## 5.7 Low carbon transport

5.7.1 Transport has already been discussed extensively as a major and persistently high source of emissions nationally (see Section 3) and locally (see Section 4). Furthermore, transport has already been a focus within this section of the report, namely as part of the review of interventions in respect of:

- Spatial strategy, masterplanning and urban design – this is a primary means by which the Local Plan can minimise residents' need to travel and support modal shift away from the petrol/diesel car to active travel (walking and cycling), public transport and EVs;
- Renewable power – as being demonstrated through Energy Superhub Oxford initiative and through the numerous authorities delivering solar powered carports with battery storage, the roll-out of rapid EV charging infrastructure necessitates innovative approaches to decentralised power supply and storage.

5.7.2 This section presents a brief review of options open to the Local Plan in respect of:

- Walking and cycling infrastructure;
- Public transport;
- EV charging infrastructure;
- Other 'sustainable transport' interventions.

[167] See solarpowerportal.co.uk/news/ashford_borough_council_eyes_9mw_solar_farm_as_significant_income_boost
[168] See solarpowerportal.co.uk/news/bristol_launches_1_billion_net_zero_procurement_programme
[169] See solarpowerportal.co.uk/news/leicester_county_council_targets_new_14m_solar_farm_development
[170] See solarpowerportal.co.uk/news/newport_city_council_unveils_plans_for_up_to_2mw_of_rooftop_solar_across_21
[171] See solarpowerportal.co.uk/news/northumberland_council_800kw_solar_carport_install_to_get_go_ahead
[172] See westofengland-ca.gov.uk/local-energy-scheme/
[173] See solarpowerportal.co.uk/news/council_owned_solar_farm_surpasses_generation_targets_records_highest_incom
[174] See solarpowerportal.co.uk/news/wokingham_gears_up_for_school_solar_installs_to_help_meet_carbon_neutral_20
[175] See solarpowerportal.co.uk/news/york_set_for_400kw_hyperhub_solar_carport_with_storage

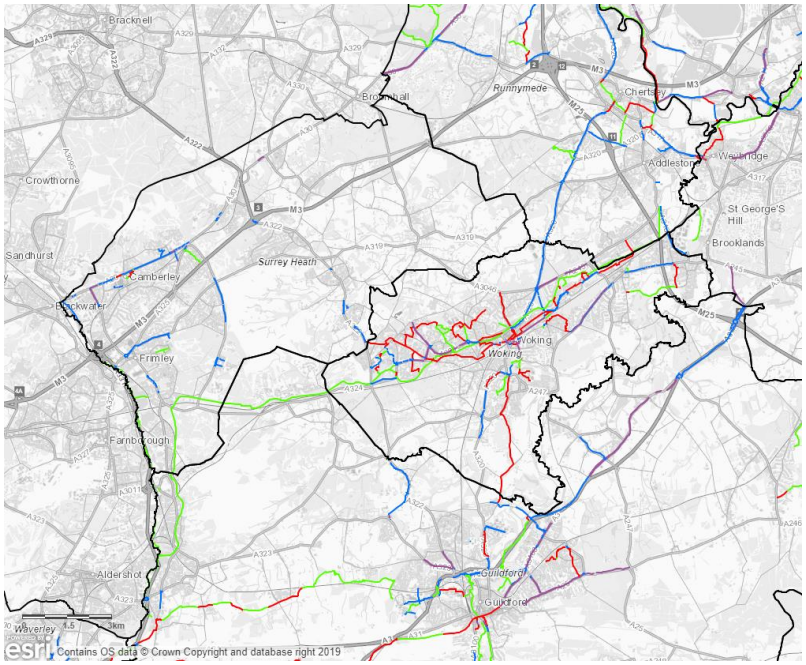
## Walking and cycling infrastructure

5.7.3 As discussed in Section 3, there is currently *"a once in a generation opportunity to deliver a lasting transformative change in how we make short journeys in our towns and cities"*.

5.7.4 Surrey County Council takes a lead with respect to many aspects of the transport agenda, including in respect of cycle infrastructure, with a Surrey Cycle Strategy published in 2014 and a plan now in place for all Surrey authorities including Surrey Heath: www.surreycc.gov.uk/roads-and-transport/sustainable-travel/cycling/plans/surrey-heath.

5.7.5 Central to the plan is the Surrey Cycle Infrastructure Map, which maps existing and potential future cycle routes, with routes placed into five categories, as well as other key infrastructure including cycle parking, controlled crossing, subways and other point infrastructure. Figure 5.14 shows *existing* routes for Surrey Heath and neighbouring Surrey authorities.

*Figure 5.14: Existing cycle routes in Surrey Heath and neighbouring Surrey LPAs*




5.7.6 Local Plan spatial strategy can take account existing and potential cycle infrastructure, recognising that developer funding can facilitate significant upgrades. Steps might be taken to ground-truth the Surrey-wide map at the Surrey Heath scale, and potentially build-upon it by identifying priority routes (see Guildford BC case-study, below), and similar work might also be undertaken for walking routes.

5.7.7 Beyond the Local Plan, there is a clear need for the Borough Council to work with the County Council to maintain and improve the Surrey Heath Cycle Plan, including by understanding existing and potential links to neighbouring authorities in Berkshire and Hampshire.

5.7.8 Finally, there is a need to consider the role of the Council's Community Infrastructure Levy (CIL, 2014). The Regulation 123 list presents eight types of project that may be funded through CIL, including: local transport projects not directly related to a development; and strategic transport projects.[176]

## Public transport

5.7.9 Firstly, in respect of rail infrastructure, the main urban area of the Borough benefits from good rail connectivity, Bagshot also benefits from a railway station, and there is also good potential to access a rail station from several other settlements by bus or cycling. These are all key considerations for Local Plan spatial strategy and site selection. Other matters for the Local Plan could include supporting the business case for strategic upgrades to the rail network, even to include the reopening of closed lines (e.g. the Cranleigh Line in Surrey); however, no significant opportunities are known to exist in Surrey Heath.

[176] See surreyheath.gov.uk/residents/planning/planning-policy/other-planning-documents/community-infrastructure-levy-cil

5.7.10 With regards to the bus network, the County Council again takes the lead, working in partnership with bus companies (Stagecoach and several others).[177] The main urban area falls within the Blackwater Valley network area, such that there are better north/south links in the Borough than links east to Woking; Bagshot and Lightwater link to both Camberley and Brookwood / Woking; West End and Bisley link better to Brookwood / Woking than to Camberley; whilst Chobham only links well to Woking. The County Council notably distinguishes between 'frequent' and 'other' bus routes.

5.7.11 There is no information available on routes in need of increased patronage or opportunities to deliver new routes or improve existing routes. However, this information can be sought from the County Council and bus companies through consultation, and consultation will be most effective where there are spatial strategy alternatives presented for discussion.

### Guildford Borough case-study

*5.7.12* Guildford Borough Council prepared a Borough Transport Strategy in 2017, in support of the emerging Local Plan,[178] which presented a Sustainable Movement Corridor (SMC) as a central element, linking three of the five strategic allocations with Guildford Town Centre.[179] Figure 5.15 shows the SMC linking with the three urban edge strategic allocations (shown in pink), as well as the proposals for three new rail stations, a new park and ride and several other 'SMC' priority schemes, which include proposals for improvements to bus services and cycling infrastructure. The SMC served as an element of the justification for the Local Plan spatial strategy, and the Local Plan states:

*"New development providing, contributing and/or close to the routes of the proposed Sustainable Movement Corridor in the Guildford urban area will have regard to the Sustainable Movement Corridor Supplementary Planning Document."*

5.7.13 The Local Plan's strategic allocation at Wisley Airfield was of note for not linking to the SMC; however, the adopted site-specific policy requires: *"An off site cycle network to key destinations including Effingham Junction railway station, Horsley railway station/Station Parade, Ripley and Byfleet to be provided with improvements to a level that would be attractive and safe for the average cyclist."* Detailed requirements are now being examined through a Strategic Development Framework SPD.[181]

5.7.14 More widely, there has been a considerable focus on provision of cycle infrastructure, with the 2003 Local Plan defining specific routes where cycle improvements would be supported by Guildford BC. The new Local Plan (2019) provides overarching policy support and the new emerging Development Management Policies Plan proposes a policy on *"Achieving a Comprehensive Guildford Borough Cycle Network"* which, as currently drafted, states:[180]

*"The aim of this policy option is to achieve a comprehensive Guildford borough cycle network. The Policies Map will be updated using the cycle network plan outputs from the following sources: Guildford BC's Route Assessment Feasibility Study, for the Guildford urban area [and] Surrey CC's Guildford Local Cycling Plan, particularly for the rest of the borough outside of the Guildford urban area.*

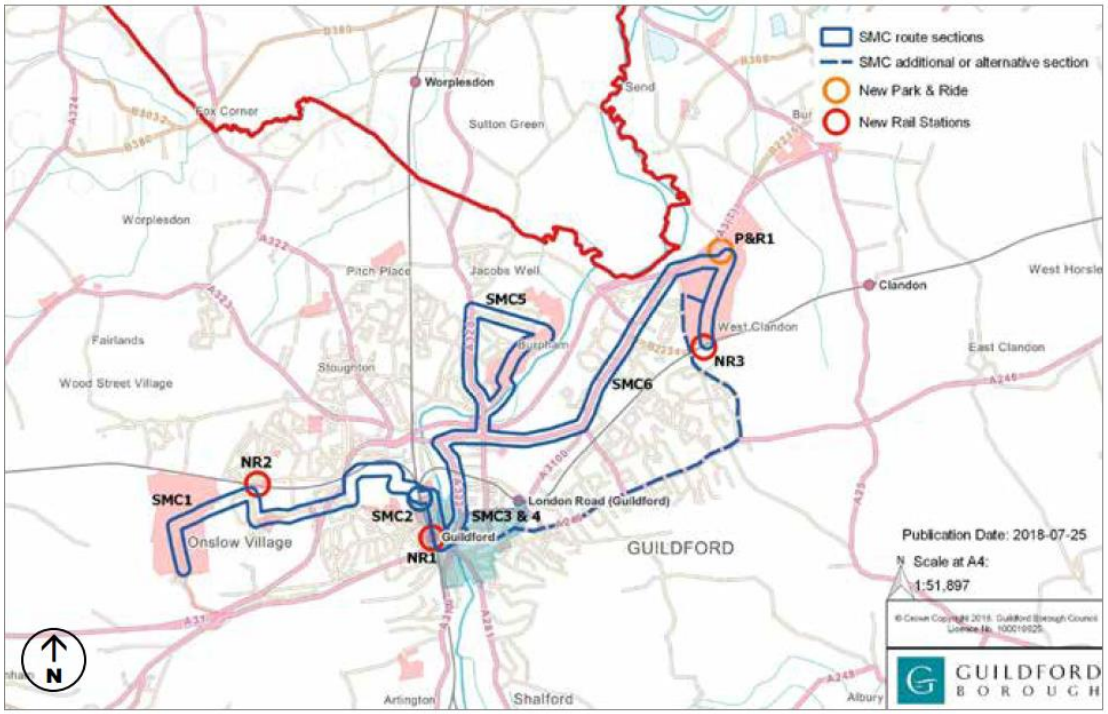
*The Policies Map will therefore show specific routes along which the Council, working with Surrey County Council the Local Highway Authority and other partners, will undertake or promote measures to encourage cycling, including improvements to the safety and convenience of the routes, the designation of cycle tracks, the designation of cycle lanes, and the signposting and the provision of cycle parking facilities.*

*The policy will require that new developments have regard to the Guildford borough cycling plan, as represented on the updated Policies Map, in addressing the requirements of Policy ID3 Sustainable transport for new developments in the Local Plan: Strategy and Sites."*

5.7.15 This targeted approach, with a detailed study completed for the urban area to complement the Surrey Cycle Infrastructure Map, which is sufficient for the rural area, has clear merit. The Route Assessments Feasibility Study (Transport Initiatives and Urban Movement, 2019), which is presented as Appendix I in Guildford's consultation document, places current and potential future routes into a number of categories.

[177] See surreycc.gov.uk/roads-and-transport/buses-and-other-transport/bus-timetables/maps-of-routes-and-stops
[178] See guildford.gov.uk/localplan/transport
[179] See surreycc.gov.uk/roads-and-transport/sustainable-travel/cycling/plans/guildford
[180] See guildford.gov.uk/article/24071/Local-Plan-Development-Management-Policies-consultation

*Figure 5.15: Guildford Borough Sustainable Movement Corridor (SMC)*[181]




## EV charging infrastructure

5.7.16 Provision of electric vehicle (EV) charging points will drive the uptake of EVs, and it is important to recall that EVs can also provide energy storage that can deliver smart energy networks which, in turn, supports decentralised LZC power generation and the electrification of heating.

5.7.17 Data published by DfT shows the number of chargepoints per head of population, and also the number of rapid chargepoints within each LPA (it is also possible to obtain data on the number of EVs registered locally).[182] The DfT data shows that Surrey Heath is in the bottom 20-40% of LPAs nationally in respect of chargepoints per head of population, performing worse than neighbouring Hart, Rushmoor and Runnymede; however, Surrey Heath performs relatively well in terms of number of rapid chargepoints.

5.7.18 There is clear potential for the Local Plan to require provision of charging points as part of any new developments likely to result in trips by car. This is typically considered alongside the matter of ensuring adequate parking space and space for cycle storage (with cycle storage being a particular issue for flats). In addition to residential parking spaces, there is also a roll for the Local Plan in respect of considering EV charging infrastructure standards for other types of scheme, including for employment and retail.

5.7.19 Surrey County Council's Vehicular and Cycle Parking Guidance (2018) sets out standards for the provision of electric vehicle charging points in new developments; however, there is the potential to supplement this to reflect local priorities (albeit whilst recalling viability considerations).

5.7.20 There is also a major role for 'stand-alone' delivery of on-street and off-street rapid chargepoints, i.e. delivery of chargepoints by means other than as part of a planning application for a wider development scheme. However, this is primarily a matter for the County Council, whose current position is that:[183]

*"We want to see a coordinated network of charging points that will give residents and visitors the confidence to use electric vehicles in Surrey. To achieve this, we are developing a strategy that will define the role of the county council and evaluate the options for a public charging network.*

*There are a number of questions that need to be considered before charging points are introduced into Surrey on a widespread basis. These include:*

[181] See guildford.inconsult.uk/consult.ti/SDFSPD/consultationHome
[182] See maps.dft.gov.uk/ev-charging-map/
[183] See surreycc.gov.uk/roads-and-transport/policies-plans-consultations/policies-and-plans/electric-vehicle-on-street-charging-policy

- Where should charging points be located to provide the greatest possible benefit to users…?
- Should the council… run public charge points or… another organisation? How will they be funded?
- Should parking spaces be reserved for electric vehicles?
- What will the impact be on the electricity network in Surrey?"

5.7.21 In 2020, the County Council was awarded £470,000 by the Enterprise M3 Local Enterprise Partnership to install 80 fast on-street charging points for electric vehicles across certain local authority areas. The partner boroughs have provided a combined match funding of £170,000 and, along with an additional £15,000 private sector funding, provides a total project budget of £656,000.[184]

5.7.22 There is also a need to consider setting policy criteria in respect of EV charging as part of policy on urban design, the urban realm and private amenity space. Furthermore, all schemes, whether they provide charging points or not, should be designed so that future installation of charging infrastructure is simple, for example, by ensuring that adequate ducting is provided to avoid the need for future excavation.

### Different speeds of charge points

5.7.23 Faster charging is becoming increasingly important as the size of vehicle batteries increases. In the past there has been support for speeds as low as 3kw; however, modern batteries can take over 12 hours to charge at this speed. A recent Government report discusses speeds up to 350kw.[185]

5.7.24 However, EV charging places major strain on electricity networks. For example, in the Surrey Heath context, the Princess Royal Barracks (Deepcut) strategic site is not providing EV charging on the basis of insufficient grid capacity locally.

5.7.25 It follows that there is a need for a spatially targeted approach to EV charging infrastructure, as well as a need to explore innovative solutions including battery storage. With regards to taking a spatially targeted approach, there is a need to differentiate between:[186]

- **Journey charging** – this is where the driver's primary purpose for being at the chargepoint is to charge the vehicle, and hence there is a need for a rapid burst of charge. Petrol/diesel filling stations are suitable locations, as are taxi ranks (so that taxis can charge between customers).
- **Grazing charging** – the driver's reason for being at the chargepoint is primarily for a purpose other than for charging (e.g. at a supermarket), and hence the charging speed can be slower.
- **Home and work charging** – where trickle speeds can be appropriate.

5.7.26 With regards to innovative solutions, there are particular opportunities to pair public charging facilities with renewable energy and/or battery systems. Solar canopy arrays at car parks for example represent a well-aligned opportunity to maximise the use of solar power for the purpose of charging EVs. The generation profile of the solar installation will likely match the demand profile (i.e. highest occupation during the day when solar generation is at its peak), and visual impacts can often be deemed acceptable.

*Figure 5.16: An example of a solar carport*[187]

[184] See news.surreycc.gov.uk/2020/02/13/surrey-county-council-wins-funding-from-em3-lep-for-electric-vehicle-charging-points/
[185] See gov.uk/government/publications/government-vision-for-the-rapid-chargepoint-network-in-england/government-vision-for-the-rapid-chargepoint-network-in-england
[186] Based on work by the RAC Foundation, see racfoundation.org/wp-content/uploads/Development_of_the_UK_CPN_Harold_Dermott_December_2018.pdf
[187] Source: BRE (2016) Solar Car Parks: A Guide for Owners and Developers, see https://www.bre.co.uk/filelibrary/nsc/Documents%20Library/BRE/89087-BRE_solar-carpark-guide-v2_bre114153_lowres.pdf

## Other 'sustainable transport' interventions

5.7.27 Whilst key matters for the Local Plan relate to support for active travel, public transport and EV charging infrastructure, there are a range of other considerations relating to the increasing role of technology, as explored through the Government's Future of Mobility Strategy (2019).[188] The foreword explains:

*"Britain is on the verge of a transport revolution. For much of the past half century, many of the improvements to transport have been gradual and incremental, and focused on increasing the capacity of existing infrastructure to meet growing demand. Yet today, radical new technologies are emerging that within a generation will transform everyday journeys. Zero tailpipe emission cars are replacing those powered by fossil fuels. Self-driving vehicles will soon allow disabled people and older people to enjoy the freedom to travel that the rest of us take for granted. And advances in data will improve the way that transport services are devised, planned and delivered for the passenger.*

*… Life in Britain was reshaped by motor vehicles and mobility was improved for the majority, but not every change was positive. This time must be different. The best transport technologies of the future will not just make journeys faster, they will also make them safer, easier, more comfortable and more affordable. They will make our towns and cities quieter and less polluted. And they will give us the option to see mobility as a service, integrated and accessible to all.*

*… Much of the change in travel will happen first and fastest in urban areas, where transport is busiest, economic opportunities greatest, and space most restricted… We will be setting out our thinking on the future of rural mobility in due course..."*

5.7.28 Key concepts include:

- Mobility as a Service – the integration of various modes of transport along with information and payment functions. Recent services that allow customers to purchase monthly subscription packages giving them access to public transport and private taxi and bike hire schemes are an example.
- Shared mobility – transport services and resources that are shared among users, either concurrently or one after another. Public transport, or mass transit, as well as newer models such as car-sharing, bike-sharing and ride-sharing, are all types of shared mobility.
- Demand responsive public transport – a flexible service that provides shared transport in response to requests from users specifying desired locations and times of pickup and delivery. Dial-a-ride services scheduled through next day or advance bookings are a traditional example.
- Car clubs – use electronic systems to provide customers unattended access to cars for short-term rental, often by the hour. Business models can be categorised into round-trips, where the vehicle must be returned to its home station, and flexible, allowing one-way trips.
- Ride-hailing - use smartphone apps to connect paying passengers with licensed taxi drivers or private hire vehicle operators who provide rides for profit.
- Micromobility – the use of small mobility devices, designed to carry one or two people, or 'last mile' deliveries. E-scooters and e-bikes are examples.

5.7.29 The document explains that: *"We want cities, towns and city regions to use the Principles to guide their work and decisions, while recognising that the right methods for delivery will depend on local conditions and needs."* There is also a commitment to publishing further guidance on *"preparing the urban environment… to support local decisions about the design and allocation of urban space."* There will be a range of considerations, and some notable tensions; however, there will certainly be the potential to reimagine the role of car parks in town centres, such as Camberley.

5.7.30 Support for new forms of micromobility should be a consideration for the Local Plan, with the document explaining: *"New technologies and trends mean vehicle designs are changing radically, with ever more options for people to choose how they travel. This is particularly true for the micromobility sector, where we are seeing the rapid development of vehicles such as electric scooters and skateboards, low powered last mile delivery solutions and a blurring of previously long established vehicle definitions."*

[188] See https://www.gov.uk/government/speeches/future-of-mobility-urban-strategy

5.7.31 The matter of supporting efficient and low carbon last mile deliveries, including food deliveries, has been brought to the fore through the recent Covid-19 lockdown,[189] and potentially will have implications for Local Plans, including planning for out of town logistics / warehousing uses, and even considering spaces in town centres for drone take-off and landing. It is also noted that the Government is currently consulting on *"whether certain micromobility vehicles (such as electric scooters) should be permitted on the road."*[190]

5.7.32 There are also recent calls to define e-bikes as a strategically important mode of transport for planning policy purposes, including with a view to capitalising on post-Covid opportunities (relating to an uptake in cycling) and risks (relating to modal shift from public transport to the private car).[191]

## 5.8 Other intervention options

5.8.1 The scope of the Surrey Heath Local Plan, when taken into consideration alongside the review of baseline carbon emission sources presented in Section 4, serves to suggest that Local Plan climate change mitigation interventions should focus on the matters discussed above. However, more marginal considerations also include:

- Waste management
- Land use;
- Industry;
- Retrofitting.

### Waste management

5.8.2 *Waste, Our Resources: A Strategy for England* (2018) is particularly concerned with ensuring that society's approach to waste aligns with 'circular economy' principles, which in summary means keeping resources in use as long as possible in order to extract maximum value from them. It does not include a focus on strategic planning for waste management facilities, although it does support energy from waste (EfW) facilities, of which there are 40 in England, in particular where these operate in CHP mode (eight in England). The Government has indicated that the *Waste Management Plan for England* will be updated in the near future; however, this strategy will be relevant to the County Council's Waste Management Plan more so than the Local Plan.

5.8.3 The Surrey Waste Local Plan 2019-2033 is soon to be adopted, with the Inspector's Report having been published in May 2020.[192] The plan allocates six sites for waste management uses, none of which fall within Surrey Heath. Also of note is the Surrey Ecopark, at Shepperton, which is under construction and once operational will treat a third of the county's household waste.[193]

5.8.4 The role of the Local Plan is more limited, although there are potential Local Plan interventions aimed at supporting good waste management higher up within the waste chain. In particular, there is a role for the Local Plan in respect of requiring urban design measures, and potentially building design measures, that enable efficient and effective separation of waste at or close to source.

### Land use

5.8.5 The Environment Bill introduced into Parliament in January 2020 is set to deliver on the vision set out in the 25 Year Environment Plan, which identified a major carbon sequestration opportunity associated with creation and improved management of woodland and other habitats. An Agriculture Bill is also currently under consideration that would replace the current system of agricultural subsidies with an Environmental Land Management (ELM) scheme that would pay farmers and other land managers in England for the ecosystem services they deliver, including in respect of climate change mitigation.

[189] See theguardian.com/uk-news/2020/apr/12/robots-deliver-food-milton-keynes-coronavirus-lockdown-starship-technologies
[190] See gov.uk/government/consultations/future-of-transport-regulatory-review-call-for-evidence-on-micromobility-vehicles-flexible-bus-services-and-mobility-as-a-service
[191] See creds.ac.uk/e-bikes-could-slash-transport-emissions-and-get-britons-back-to-work/
[192] See surreycc.gov.uk/land-planning-and-development/minerals-and-waste/waste-plan/2019-2033
[193] See ecoparksurrey.uk/about/background

5.8.6 Climate change mitigation via land management is also a focus of the CCC, with *Land Use Policies for Net Zero* (2020) making a range of recommendations, including increasing UK forestry cover from 13% to at least 17% by 2050 by planting around 30,000 hectares of woodland each year.[194] This follows a Government commitment in 2018 to plant 11 million trees by 2022 and announcement of a Woodland Carbon Guarantee scheme in 2019, which aims to encourage tree planting and woodland creation.

5.8.7 However, Surrey Wildlife Trust (2020) urges caution, identifying the importance of "*not compromising land suited for other, more relevant uses in the landscape"* that will be better for recovery of biodiversity and delivery of ecosystem services in the long-term.[195] The Surrey Nature Partnership has also prepared a position statement (2020), with key points including:

- "Tree planting in the South-East of England is not a particularly effective approach to mitigating climate change… tree planting should not be regarded as an alternative to more direct actions."
- "Tree planting on low-grade arable and pasture land could be supported, but never on open land of any importance for its associated biodiversity."
- In summary, there is a need for the: "Right Tree in the Right Place, for the Right Reasons"

5.8.8 A key consideration for the Local Plan is the 25 Year Environment Plan's commitment to *"embedding an 'environmental net gain' principle for development, including housing and infrastructure"*. An environmental net gain approach involves taking into account wide ranging ecosystem services, including carbon sequestration, as part of land-use decision-making (e.g. Local Plan spatial strategy and site selection), with a view to maximising the net benefits across all ecosystem services. However, this is inevitably a complex undertaking, as there can be conflicts between ecosystem services. For example, and of particular relevance to the Surrey Heath context (and Surrey more widely – see discussion above), woodland creation or afforestation can perform well from a carbon sequestration perspective, but lead to negative implications for biodiversity where current, more open land uses, have a biodiversity value. Figure 5.17 shows the prevalence of heathland surrounding Lightwater, by way of an example.

*Figure 5.17: Land uses surrounding Lightwater*[196]


[194] See theccc.org.uk/publication/land-use-policies-for-a-net-zero-uk/
[195] See surreywildlifetrust.org/what-we-do/restoring-surreys-nature/climate-emergency
[196] See surreyheath.gov.uk/residents/planning/planning-policy/planning-and-supplementary-planning-documents/lightwater-village

5.8.9 In short, a key message is that whilst the climate emergency serves to highlight the importance of afforestation and woodland creation, and there is the potential for the Local Plan to support targeted afforestation and woodland creation through spatial strategy and site selection, there remains a need to balance competing objectives, and ultimately ensure *"the right tree in the right place, for the right reasons"*.

5.8.10 Finally, with regards to planting native hedgerows, street and urban trees, this is a less contentious proposition, and broadly supported both from a climate change mitigation and a biodiversity perspective (although there can be certain tensions with other urban design objectives, e.g. crime and safety). The Surrey Nature Partnership is supportive, although highlights that:[195]

- Large-scale and street tree planting schemes have a poor record of success due to neglected aftercare, perhaps due to under-funding.
- There will always be a need for careful consideration of which tree species are appropriate for planting in any given site or area [including for bio-security reasons, noting Ash dieback].
- Allowing natural regeneration is usually far more successful at establishing resilient, native woodland than managed and costlier tree planting schemes.

## Industry

5.8.11 Moving to a low carbon economy is a central objective of the NPPF (see paragraph 8) and is also a central pillar of the UK's Industrial Strategy.[197]

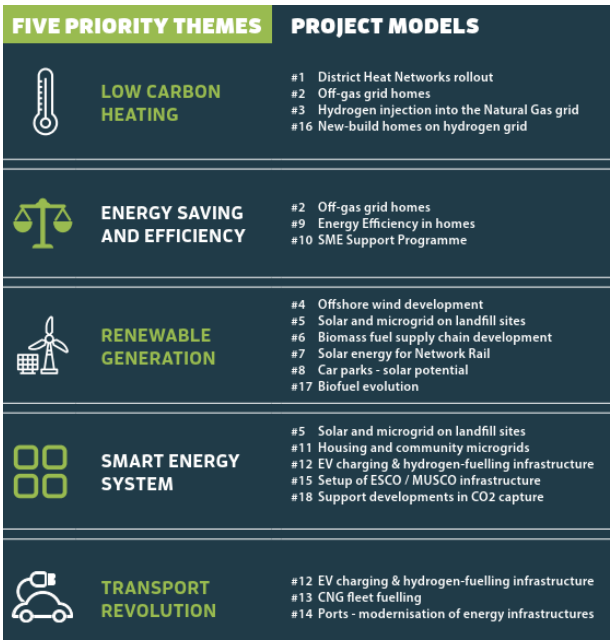
*5.8.12* The low carbon economy is also a focus of the emerging Local Industrial Strategy for the Enterprise M3 Local Enterprise Partnership (LEP).[198] The LEP explains that: *"Our vision at Enterprise M3 LEP is for our region to become a leader in sustainable energy, and decarbonised, clean economic growth."*

5.8.13 A Local Industrial Strategy for the Enterprise M3 LEP is in preparation; however, a Local Energy Strategy was published in 2019 jointly by the three LEPs covering the South East of England. The strategy identifies 18 project models under five themes (see Figure 5.18) that should secure or create over 75,000 direct jobs. The strategy identifies six priority actions:

- Move households and businesses towards low carbon forms of heat, such as district heat networks;
- Roll out greater provision of renewables, including quick-wins through the deployment of solar PV, including with a view to providing a reliable revenue stream for local authorities and local people;
- Roll out energy efficiency programmes
- Utilise smart technologies such as microgrids in communities to address network constraints;
- Facilitate the transport revolution, including by supporting EV charging and hydrogen refuelling; and
- Longer term interventions like the establishment of hydrogen gas grids.

5.8.14 All of the ambitions of the Local Energy Strategy can and should be supported by the Local Plan, via interventions discussed above. Furthermore, there is a role for the Local Plan in respect of delivering high quality new employment floorspace supportive of research, design and manufacturing and the agglomeration of businesses involved in the green economy.

*Figure 5.18: The LEP Local Energy Strategy*




[197] See gov.uk/government/publications/industrial-strategy-building-a-britain-fit-for-the-future
[198] See enterprisem3.org.uk/hub/clean-growth

## Retrofitting

5.8.15 Retrofitting existing homes and communities to improve fabric standards/efficiency and support the electrification of heating is a national priority. The fact that the Government's ambition to deliver 300,000 new homes annually amounts to an annual increase in the national stock of c.1.3% serves its importance.

5.8.16 Retrofitting is also often discussed as a national priority from an economic perspective, given the potential to create jobs at a variety of skill levels and distributed across the country. For example, a very large labour force will be required to replace the estimated 25 million gas boilers nationally, and the Energy Technologies Institute (ETI) has recently estimated that there may be 10 million homes nationally that require significant fabric retrofits.[199] Figure 5.19 presents five example retrofitting 'pathways' identified by ETI, each involving work over 10 to 15 years.

5.8.17 However, there is limited potential to support retrofitting through Local Plans, recognising that many measures will not require planning permission, with the PPG highlighting only that "local planning authorities should ensure any advice to developers is co-ordinated to ensure consistency between energy, design and heritage matters."[200] Potential historic environment tensions are a focus of the policy on "Energy efficiency in existing developments" presented in the Draft Wokingham Local Plan (2020): *"Development proposals which would result in considerable improvements to the energy efficiency, carbon emissions and/or general suitability, condition and longevity of existing buildings will be supported... The sensitive retrofitting of energy efficiency… in historic buildings… will be encouraged, providing the special characteristics of the heritage assets are protected."*

5.8.18 Local authorities can take a lead on rolling-out retrofitting of their own housing stock, and can also support programmes locally that support retrofitting of private housing stock.[201] Also, a related consideration is the potential to redevelop existing local authority-owned housing stock that is dated and energy inefficient, which typically also provides an opportunity to achieve wide ranging regeneration objectives, and also deliver a net increase in the number of homes on a given site.[202]

5.8.19 Finally, in respect of retrofitting, there is a need to consider the matter of designing and constructing buildings such that they lend themselves to future retrofitting (albeit this will be a long time into the future; potentially even subsequent to decarbonisation target dates), which is a matter that has already been discussed above, as part of the discussion of taking a WLC approach to development.

*Figure 5.19: Example retrofitting pathways identified by ETI*

| House | | Stage 1 | Stage 2 | Stage 3 | Stage 4 |
|---|---|---|---|---|---|
| House A<br>1950s<br>semi-detached |  | Cavity wall insulation<br>Multizone control<br>(Y1-5) | New doors & windows<br>Four new high output radiators<br>(Y3-13) | 6kW ASHP with EITHER existing boiler OR hot water cylinder<br>(Y6-12) | |
| House B<br>1920s<br>terraced |  | Insulate suspended floor<br>Multizone control<br>(Y1) | New doors & windows<br>Insulate walls<br>One new high output radiator<br>(Y3) | 6kW ASHP with hot water cylinder OR interface to district heating network<br>(Y6-10) | |
| House C<br>1930s<br>semi-detached |  | More loft insulation<br>Multizone control<br>Four high output radiators<br>(Y1) | 8kW ASHP with existing boiler<br>(Y2-5) | Internal wall insulation<br>(Y5-10) | Remove boiler<br>Add hot water cylinder<br>Insulate conservatory and extension roofs<br>(Y10-15) |
| House D<br>1970s<br>terraced |  | Insulate walls<br>More loft insulation<br>Multizone control<br>Two larger, high output, ground floor radiators<br>(Y1) | New windows and doors<br>(Y6) | 6kW ASHP with addition of hot water cylinder<br>(Y10) | |
| House E<br>1980s<br>detached |  | Insulate extension loft<br>Multizone control<br>Limit conservatory set-point<br>(Y1) | Opaque insulated roof and ultra-low U windows on conservatory<br>(Y4) | New windows and doors downstairs<br>Larger heated towel rail<br>(Y7) | 8kW ASHP OR 8kW GSHP, both with addition of 250l hot water cylinder<br>(Y10) |

[199] See eti.co.uk/insights/the-journey-to-smarter-heat
[200] See gov.uk/guidance/climate-change#how-can-local-planning-authorities-support-energy-efficiency-improvements-to-existing-buildings
[201] For example, see ukgbc.org/news/towns-and-cities-to-work-together-on-home-retrofit-as-calls-for-green-recovery-mount/
[202] See ukgbc.org/wp-content/uploads/2017/09/08498-Regen-Retrofit-Report-WEB-Spreads.pdf

# 6 Conclusion of Part 1

6.1.1 This part of the report has examined the context to taking steps to mitigating climate change through the Local Plan; the baseline decarbonisation trajectory that must be improved upon, including through Local Plan interventions, if Surrey Heath is to make a full contribution to the achievement of the national 2050 net zero target; and Local Plan intervention options open to the Council, albeit recognising that the Local Plan will need also need to balance wide ranging and sometimes competing objectives.

6.1.2 With regards to the analysis of decarbonisation scenarios, the headline conclusion is that a baseline scenario sees a **40% reduction** in emissions (on a 2017 base year) by the end of the plan period (2040), whilst there is a need to achieve a **70% reduction** by 2040 if the Borough is to be on track to achieve net zero by 2050. The difference between these two figures is the 'policy gap' to be addressed insofar as possible by the Local Plan, and the analysis shows that many of the primary emission sources are well within the scope of the Local Plan. However, achieving a net zero decarbonisation trajectory will also require interventions outside of **the Local Plan's sphere of influence**, most notably in respect of retrofitting of existing buildings, but also in numerous other respects, e.g. in respect of supporting EV uptake and new energy infrastructure. This is an important consideration from a perspective of evaluating and monitoring the performance of the Local Plan, i.e. it would not be fair to hold the Local Plan solely to account for achieving a net zero decarbonisation trajectory.

6.1.3 In order to summarise the review of potential Local Plan interventions, it is helpful to consider each of the key requirements of the NPPF in respect of climate change mitigation in turn:

- Para 148: **Shape places** in ways that contribute to radical reductions in emissions – spatial strategy and site selection options in Surrey Heath are limited by environmental constraints and the Green Belt; however, there will be room for manoeuvre nonetheless, and strategic choices to be made. It will be for the Council to define discrete spatial strategy alternatives that can then be subject to analysis / appraisal (including through the Sustainability Appraisal process for the Local Plan) and consultation, with a view to fully understanding differential performance in respect of climate change mitigation. It is beyond the scope of this study to suggest particular options to pursue, but it is fair to highlight that strategic growth locations, including new settlements and town centre regeneration, can offer excellent opportunities. Finally, closely linked to the matter of spatial strategy-making / site selection is the matter of allocating a quantum/density of development to each site and setting development management (DM) policy, including in respect of urban design and infrastructure.
- Para 148: Encourage the **reuse of existing resources** including the conversion of existing buildings – redevelopment within the urban area is a key matter for the Surrey Heath Local Plan, in that a high proportion of the housing land supply identified will likely involve redevelopment within the urban area. It is not clear that the question "what is the potential to reuse existing resources" can realistically be applied as a site selection criterion; however, it could be proportionate and reasonable to explore this question with site promoters prior to allocating a quantum of growth to any given site. Beyond this, there is a clear role for the Local Plan to set DM policy in respect of minimising embodied carbon across the whole lifecycle of development, such that this can then be a matter for scrutiny at the DM stage.
- Para 148: Support **low and zero carbon (LZC) energy** and associated infrastructure – the primary energy supply consideration for the Local Plan is in respect of LZC heat, as this matter is highly relevant to spatial strategy, site selection, masterplanning and urban design. There is also a role in respect of supporting LZC power generation, in particular solar PV, the roll-out of EV charging infrastructure and 'associated infrastructure', in particular battery storage.
- Para 150: **Plan new development** to reduce emissions, e.g. through location, orientation and design – aside from the crucial matter of spatial strategy and site selection, there is also a significant role for the Local Plan in respect of masterplanning, urban design and building design standards.

  With regards to masterplanning and urban design, a key matter is the need to give due consideration to options for Camberley town centre prior to determining a growth quantum and setting DM policy, in particular with a view to ensuring that opportunities for LZC heat and sustainable transport are realised; however, other strategic growth locations may also be associated with similar opportunities to be realised through the Local Plan, as opposed to leaving matters to the DM stage of planning.

With regards to building design and emissions standards, NPPF para 150 explains that "any local requirements for the sustainability of buildings should reflect the Government's policy for national technical standards", and the remit of Local Plans is currently uncertain following the Government's recent consultation on setting a national Future Homes Standard for emissions dealt with through Building Regulations (i.e. operational regulated building emissions). This is a complex topic; however, in short, at the current time Local Plans remain able to require that Building Regulations standards are exceeded (and specify by how much) and also specify how this is achieved, specifically the extent to which there should be a 'fabric first' approach whereby emissions reductions are achieved through efficiency ahead of via on-site LZC heat/power generation (and ahead of offsetting). Regardless of the outcome of the Future Homes Standard consultation, Local Plans will also retain the ability to set policy for matters not dealt with by the Building Regulations, including layout and design to maximise passive solar gain and minimise embodied carbon through the whole life-cycle of development.

- Para 151: Provide a positive strategy for supply of **LZC energy and heat** – there is a major role for Local Plans, including the Surrey Heath Local Plan, in respect of supporting the electrification of heat, which is a national priority. In particular, there is a need to support heat networks incorporating heat pumps which, as the Future Homes Standard consultation document explains *"provide a unique opportunity to exploit larger scale, renewable and recovered heat sources that can't be accessed at an individual building level."* Precisely how Local Plans can do this is discussed further below.

  With regards to LZC power generation and associated infrastructure, as discussed, solar PV, battery storage and EV charging infrastructure are key considerations, recognising that the Green Belt designation is likely to preclude wind power. The importance of battery storage is not to be underestimated, as this is likely to form a crucial component of future smart networks able to balance electricity supply and demand under a scenario whereby supply is decentralised and sporadic over time (e.g. due to weather) and demand is greatly increased due to the electrification of heat and transport.

- Para 151: **Consider identifying suitable areas** for supply and supporting infrastructure – aside from selecting sites able to deliver LZC infrastructure onsite, there is also the potential for the Local Plan to set policy criteria to guide subsequent planning for LZC infrastructure, whether that be via a Neighbourhood Plan or a 'windfall' planning application. The Local Plan might also go further (a "proactive approach", in accordance with NPPF para 149) by identifying areas of search for LZC infrastructure (e.g. the emerging Cornwall Climate Emergency DPD) or, go even further, by allocating sites (e.g. this is an option for the Guildford DM Policy DPD); however, there is also a need to recall that the NPPF is supportive of community-led initiatives, discussed below.

- Para 151: Identify opportunities for **development to draw its energy from LZC sources** and for co-locating potential heat customers and suppliers – there is greatest potential for heat networks to be viable when designed-in from the outset and where development is at scale (to include higher density areas and a mix of uses), in proximity to a strategic heat source (there are a wide range of possibilities) and in proximity to a strategic source of heat demand, such as a large public building. Spatial opportunities in Surrey Heath could include Yorktown Industrial Area, Frimley Park Hospital and HM Prison Coldingley.

- Para 152: Support **community-led initiatives** for LZC energy – the community energy sector is thriving nationally and locally, benefiting from NPPF and wider Government support, and there is a clear role for the Local Plan to guide and facilitate efforts and investments. Equally, local authorities are increasingly taking a proactive role in respect of funding and delivering LZC infrastructure, recognising potential revenue streams, and there is again a clear role for the Local Plan to facilitate this.

6.1.4 The other section of the NPPF of key relevance to the review of Local Plan intervention options presented above is the section on Promoting sustainable transport, recognising that there is "*a once in a generation opportunity to deliver a lasting transformative change in how we make short journeys in our towns and cities."* Also, understanding of sustainable transport issues and opportunities comes from the NPPF sections on Achieving well-designed places and Ensuring the vitality of town centres.

6.1.5 Another relevant section of the NPPF is that on Conserving and enhancing the natural environment, recognising the role of carbon sequestration interventions as part of achieving decarbonisation, although this role is not to be over-estimated.

6.1.6 Also, links between climate change mitigation and the NPPF section on Building a strong, competitive economy are also not to be underestimated, given recent calls for a 'green' and climate change mitigation focused economic recovery following the Covid-19 pandemic.

# Part 2: Adaptation

# 7 Introduction

7.1.1 The aim of this part of the report is to understand climate change risks, now and in the future, and then explore Local Plan interventions to reduce risk and strengthen resilience.

7.1.2 This part of the report answers the following questions:

- What is the context?
- What is the baseline scenario?
- What are the intervention options feasibly open to the Council?

# 8 What is the context?

8.1.1 Climate change adaptation is also a highly cross-cutting topic, reflecting the breadth of activities and assets that will be affected by climate change. However, unlike mitigation, there is something in the way of a primary definitive source of information on the issues of relevance to the Local Plan, namely the iterative process of preparing and regularly updating a Climate Change Risk Assessment (CCRA), followed by a National Adaptation Programme (NAP), followed by review work undertaken by the CCC's Adaptation Sub Committee (ASC), under a regime established by the Climate Change Act.

## 8.2 Climate change act regime

8.2.1 The Act requires the Government to present to Parliament an assessment of the climate change risks for the UK every five years. The second Climate Change Risk Assessment (CCRA2) was presented in 2017. Following the publication of each CCRA, the Government must lay out its objectives, policies and proposals to address the climate change risks and opportunities. The second National Adaptation Programme (NAP2), setting out these objectives, policies and proposals, was published in 2018.

8.2.2 The ASC is required by the Act to assess the NAP and present progress reports. The most recent progress report was published in 2019, presenting a key diagram (see Figure 8.1) and finding:

- The priority given to adaptation, including through the institutional and support framework in England, has been eroded over the past ten years.
- England is still not prepared for even a 2°C rise in global temperature, let alone more extreme levels of warming. Only a handful of sectors have plans that consider a minimum of 2°C global warming – water supply, road and rail, flood defences and flood risk planning for infrastructure.
- Many national plans and policies still lack a basic acknowledgement of long-term climate change or make a passing mention but have no associated actions to reduce risk. This includes aspects of agriculture, the natural environment, health, other infrastructure sectors and business.

8.2.3 The report concludes as follows:[203]

*"Leaving adaptation responses to local communities and individual organisations without a strategic plan is not a strategy to manage the risks from climate change. Climate change impacts and adaptation are associated with* ***market failures, and institutional or behavioural barriers*** *that require Government intervention. These barriers are caused partly by adaptation requiring numerous interactions through time and between communities, regions, and economic sectors… For individual businesses, organisations or the public, it is extremely challenging to build awareness and take adaptation actions at a scale that is effective and efficient, and that accounts for social costs and benefits…*

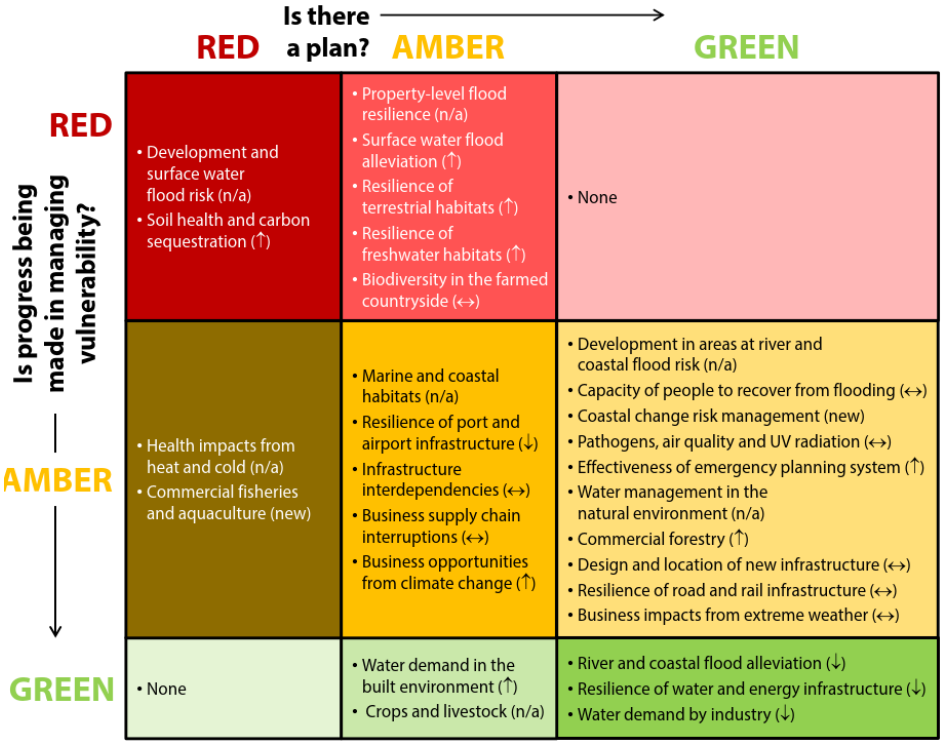
*These factors mean that adaptation action will not be successful without a strong, integrated, strategic national plan. Given the piecemeal nature of the NAP, the gaps within it, the decline in resources and local support, and the lack of progress in managing risks, the Committee's view is that the Government's approach of* ***mainstreaming adaptation has, so far, not succeeded*** *in putting in place a coherent and coordinated plan, nor the resources to enable the required actions to be carried out."*

[203] See https://www.theccc.org.uk/tackling-climate-change/preparing-for-climate-change/uk-adaptation-policy/

8.2.4 The 2019 ASC report does not give any explicit consideration to the role of Local Plans; however, from the concluding statement presented above it is fair to infer a role, in terms of putting in place a coherent and coordinated local strategy. It is also noted that the previous ASC report (2017) recommended:

*"The Government should review the effectiveness of **the land-use planning system** in achieving reductions in greenhouse gas emissions from buildings and transport, and enhancing the resilience of communities and the built environment to the impacts of climate change. The review should consider both strategic and local land-use allocation, and building and infrastructure design."*

*Figure 8.1: The ASC's review of progress against NAP priorities (2019)*




## 8.3 Planning policy and guidance

8.3.1 The **NPPF**, paragraph 148, identifies the objective to "minimise vulnerability and improve resilience" and highlights the central importance of achieving this objective in respect of flood risk. Paragraph 149 then sets out further detail, identifying the need to take into account:

*"… the long-term implications for flood risk, coastal change, water supply, biodiversity and landscapes, and the risk of overheating from rising temperatures… [and] support appropriate measures to ensure the future resilience of communities and infrastructure to climate change impacts, such as providing space for physical protection measures, or making provision for the possible future relocation of vulnerable development and infrastructure."*

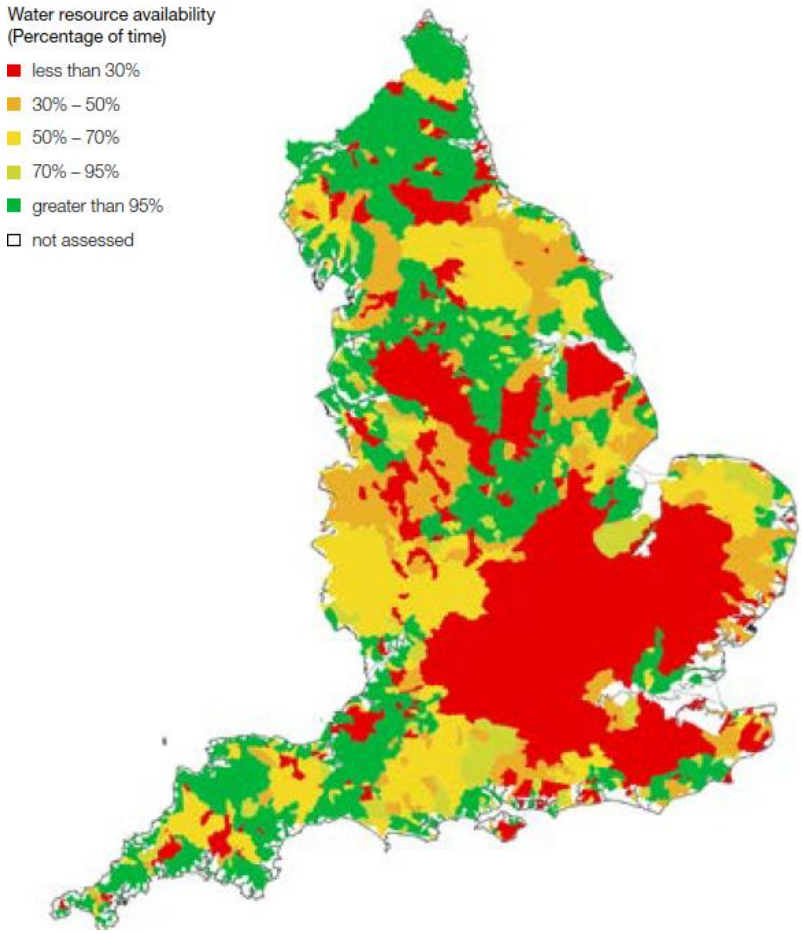
8.3.2 With regards to the **PPG**, paragraph 003 of the section on Climate Change is most relevant (although it dates from 2014). It presents 'examples' of how a Local Plan can support adaptation:

- *"Considering future climate risks when allocating development sites to ensure risks are understood over the development's lifetime;*
- *Considering the impact of and promoting design responses to flood risk for the lifetime of the development;*
- *Considering availability of water and water infrastructure for the lifetime of the development and design responses to promote water efficiency and protect water quality; [and]*
- *Promoting adaptation approaches in design policies for developments and the public realm relevant."*

8.3.3 The PPG's section on climate change also links to three further key sections within the PPG:

- **Flood risk and coastal change** – there is a well-established regime involving application of Sequential Test to Local Plans, which aims to avoid vulnerable development in areas of flood risk where possible, followed by an exceptions test that must be passed before a Local Plan can direct vulnerable development to a flood risk area. Importantly, the PPG is also supportive of Local Plans delivering or facilitating delivery of flood risk management *opportunities*, i.e. flood attenuation interventions.
- **Water supply, wastewater and water quality** – are all key climate change adaptation considerations, recognising that climate change is likely to result in major changes to the rainfall regime and, in turn, surface water and river flows. Taking each of these matters in turn:
  - **Water supply** – as explained by a recent National Audit Office (NAO) Report (2020):[204] *"Water shortages are an impending risk for the UK. Water resources are already stretched in some parts of the country, especially in the drier and more densely populated south-east."* However, there is very limited or no precedent for restricting growth due to water scarcity, with the focus instead on investing in strategic infrastructure to make water available where it is needed. It follows that the primary focus of Local Plans should be in respect of setting water efficiency standards for new development.
  - **Wastewater** – a primary consideration for the Local Plan is the need to direct growth to locations where there is existing capacity at the Wastewater Treatment Works (WwTWs) serving the area, or the potential to achieve timely capacity upgrades. In practice it is usually feasible to deliver upgrades to WwTW capacity; however, there is a need to take a precautionary approach, i.e. one that seeks to avoid risk (of WwTW capacity breaches and, in turn, pollution to water courses) in the first place.
  - **Water quality** – there is good data available to show those watercourses where water quality is an issue, and also those areas where groundwater is at risk; however, it tends to be a matter for development management more so than spatial strategy / site selection.
- **Design: Process and tools** – the guidance, which was updated in 2019, sets out ten characteristics of good design, although it is notable that the guidance does not reference climate change.

*Figure 8.2: Proportion of the year when water could be sustainably abstracted in 2019*




[204] See nao.org.uk/report/water-supply-and-demand-management/

## 8.4 Infrastructure resilience

8.4.1 Planning for resilient infrastructure is a key aspect of planning for climate change adaptation, with the NPPF highlighting the need to plan for resilient communities and infrastructure. The National Infrastructure Commission (NIC) has published the National Infrastructure Assessment (NIA, 2018), and the Government is currently preparing a **National Infrastructure Strategy**.

8.4.2 The NIC has also published *Strategic Investment and Public Confidence*, which notes that *"the regulatory system has not adequately addressed societal interests: it needs to work more effectively to achieve net zero greenhouse gas emissions by 2050, transition to full-fibre digital networks, and manage the increasing risks of floods and drought*." It calls for a more coordinated approach, explaining:[205]

*"The current system leaves strategy primarily to infrastructure owners and providers. But they may not be best placed to assess the coming challenges… There are some good examples of the system delivering strategic, long-term investment, however in general the system is not designed to deliver this… [R]egulators should demonstrate how they [considered] the strategic vision of… local government..."*

## 8.5 Public perceptions of climate risks

8.5.1 This recent study presents the findings of a major national survey of public attitudes on climate change. The survey found that 23% of respondents identified climate change as the most important risk to the UK over the next twenty years. The study also analysed previous survey findings to establish an important trend over time (Figure 8.3) and explored perceived climate change responsibilities (Figure 8.4).[206]

*Figure 8.3: UK views on when CC effects will be felt*

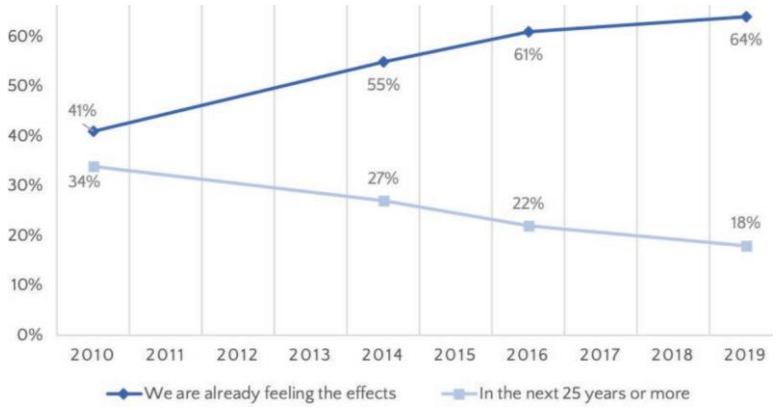
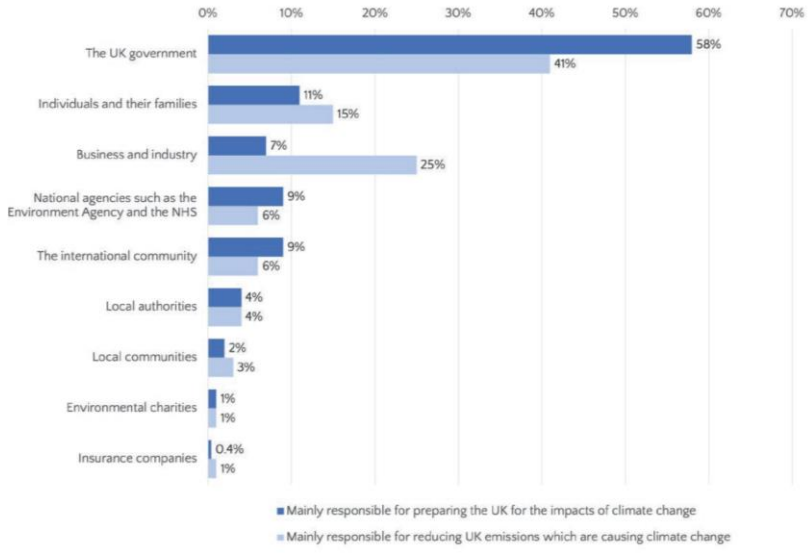



*Figure 8.4: UK views on responsibility for addressing CC*




[205] See nic.org.uk/publications/strategic-investment-and-public-confidence/
[206] See preventionweb.net/publications/view/70675

### A note on Covid-19 implications

8.5.2 As discussed above, under climate change mitigation, the Covid-19 pandemic and associated national lockdown has focused minds on climate change risks, and opportunities to place climate change at the centre of a 'green' economic recovery. The CCC wrote to the prime minister in May 2020, discussing the importance of greenspace and the potential to *"bolster the UK's slow-growing adaptation services sector."*[11] Also, the RTPI has said that:[15] *"The lockdown period has demonstrated the importance of high quality housing, resilient infrastructure, local services and green space, along with the inequalities that people face when accessing these."* The RTPI also goes further, suggesting: *"The current situation makes it all the more important to support better planning, and avoid the risk and inefficiency of deregulation, uncoordinated investment… and uncontrolled development…"*

# 9 What is the baseline scenario?

## 9.1 Introduction

9.1.1 The aim here is to explore:

- the current situation, i.e. observed climate change and current climate related risks; and then
- the likely future impacts of climate change under a baseline scenario.

## 9.2 The current baseline

9.2.1 This section considers observed climate change, observed extreme weather events and the current situation with respect to flood risk, flood vulnerability and heat vulnerability, which the context review (above) serves to highlight as key climate change adaptation considerations for Local Plans.

### Observed climate change

9.2.2 According to the latest *State of the UK Climate* report (2018):

- the most recent decade (2009–2018) has been on average 0.3ºC warmer than the 1981–2010 average and 0.9ºC **warmer** than the 1961–1990 average; moreover, all the top ten warmest years for the UK, in the series from 1884, have occurred since 2002;
- the most recent decade (2009–2018) has been on average 1% **wetter** than 1981–2010 and 5% wetter than 1961–1990 for the UK overall; and
- mean **sea level** around the UK has risen by approximately 1.4 mm/year from the start of the 20th century, which equates to an approximately 17cm increase when corrected for land movement.

### Observed extreme weather events

9.2.3 Over recent years Surrey Heath has experienced several extreme weather events that have resulted in flooding, heatwaves and droughts. Table 9.1 summarises some of the most significant severe weather events that have occurred in and around Surrey Heath since 2000.

9.2.4 Most recently, spring 2020 was the sunniest spring since records began in 1929 and, recently (June 2020), some areas were warned of drought conditions despite exceptionally wet weather and flooding earlier in the year.[207] Also, in August 2020 a significant wildfire affected Chobham Common.[208]

[207] See bbc.co.uk/news/uk-52849367
[208] See surreywildlifetrust.org/news/risk-wildfire-high-surreys-heathlands

*Table 9.1: Previous severe weather events which have caused impacts within and around Surrey Heath Borough*[209]

| Type | Date | Description | Impacts |
|---|---|---|---|
| **Drought** | 2011-2012 | Drought Order powers granted across South of England. | Water restrictions for households and businesses. |
| | 2005-2006 | | |
| **Heatwave** | July 2019 | Short, intense heatwave UK-wide, with temperatures exceeding 37ºC. | Health impacts from heat stress; Travel delays and disruptions; Disruptions to energy supply; Vegetation fires. |
| | Summer 2018 | The UK's warmest summer since 2006 and driest since 2003. | Drying up of private water supplies; Health impacts from heat stress; Low water supply for drinking and hygiene; Health implications for livestock; Blue green algae growth in water bodies; Increased incidence of fly infestation; High incidence of wildfires. |
| | July 2015 | UK-wide Level 3 Heatwave including a July temperature record. | Large wildfire (Thetford Forest); Health impacts from heat stress; Travel delays and disruptions. |
| | July 2013 | A three-week long Level 3 UK-wide heatwave, resulting in the third warmest July on record. | High incidence of wildfires; Health impacts and fatalities from heat; Increased tourism. |
| | July 2006 | July 2006 was the warmest month on record for much of the UK. | Disruptions to water and energy supply; Travel disruptions; Health impacts from heat stress; Strain on health and fire services; Numerous grass / heath / forest fires; Increased tourism. |
| | August 2003 | A 10-day UK-wide heatwave, with a record maximum of 38ºC. | Health impacts and fatalities from heat; Low river flows and lake levels; High incidence of forest fires; Reduced water supplies; Fatality of livestock and crop failure; Travel delays and disruptions. |
| **Flooding** | February 2020 | UK-wide flooding brought about by intense rainfall from Storm Ciara and Storm Dennis. | Travel delays and disruptions.<br>Flooding of properties and agricultural land. |
| | December 2013 | Over 50 millimetres of rainfall fell in in Surrey in 24 hours, resulting in rapid flooding along the River Wey and the River Mole catchments. | Over 400 properties flooded; Disruptions to energy supply; Travel delays and disruptions. |
| | July 2007 | High rainfall across the Thames River Basin, and already saturated ground meant that drains were overwhelmed, which led to surface water flooding. | Over 150 properties flooded; Disruptions to water and energy supply; Travel delays and disruptions. |
| | 2006 | Localised storm conditions in North West Surrey caused flash flooding in Aldershot, Ash, Ash Vale, Windlesham, Lightwater, Chobam, West End and Addlestone. | Over 115 properties flooded. |
| | 2003 | Flooding along the River Thames, River Bourne and River Wey. | Over 330 properties flooded. |
| | Autumn 2000 | A storm event resulted in flooding along the River Wey and River Mole. | Over 500 properties flooded; Evacuation of residents; Travel delays and disruptions. |

[209] Sourced from Surrey's Local Resilience Forum (2016) Strategic Climate Change Guidance and from the Met Office's repository of extreme weather case studies

## Flood risk

9.2.5 A Strategic Flood Risk Assessment (SFRA) is in preparation to inform the Local Plan, and a draft version of the 'Level 1' SFRA was reviewed for the purposes of this report. Presented below are three key figures from the Draft SFRA:

- Figure 9.1 - shows main watercourses. The Borough is divided into two basic catchment areas bisected by an area of high ground (the Chobham Ridges), namely the catchment of the River Blackwater in the west (a tributary of the River Lodden) and the River Bourne catchment in the east (a tributary of the River Wey). The other key watercourse is the Basingstoke Canal, which passes south of Frimley.
- Figure 9.2 - shows the Environment Agency's Flood Alert Areas and the more tightly defined Flood Warning Areas. The extent of the Alert Areas follows the extent of fluvial flood risk zone 2, which broadly defines the extent of land where flood risk is a strategic constraint to be taken into account as part of preparing the Local Plan (see further discussion below).
- Figure 9.3 – shows the extent of a severe flooding event in 1968 and the location of other recorded flooding events. The recorded flooding events show a clear spatial distribution, and extend well beyond fluvial flood risk zone 2. See further discussion of flooding sources below.

9.2.6 Having set out these initial points, the following headings consider each of the sources of flood risk affecting the Borough in turn.

*Figure 9.1: Watercourses intersecting Surrey Heath Borough*

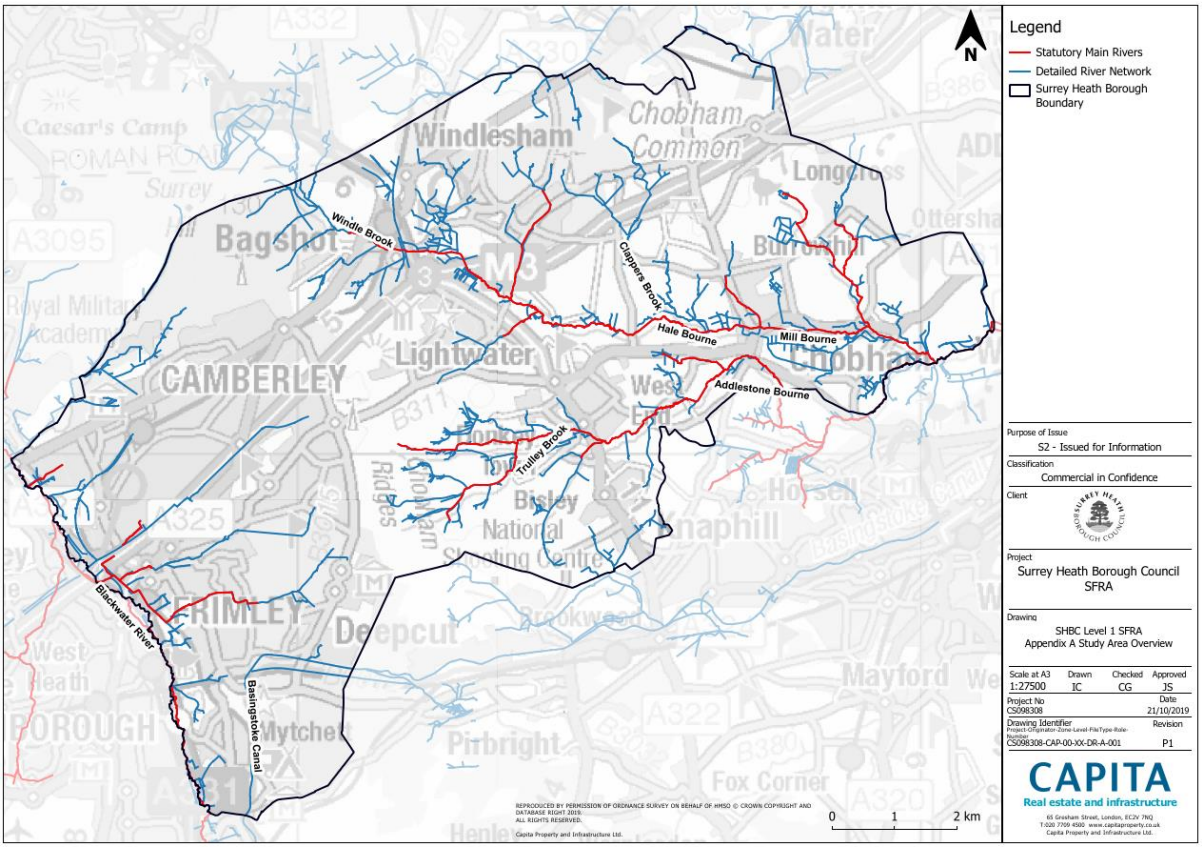


*Figure 9.2: Flood Alert Areas (corresponding to flood zone 2) and Flood Warning Areas*

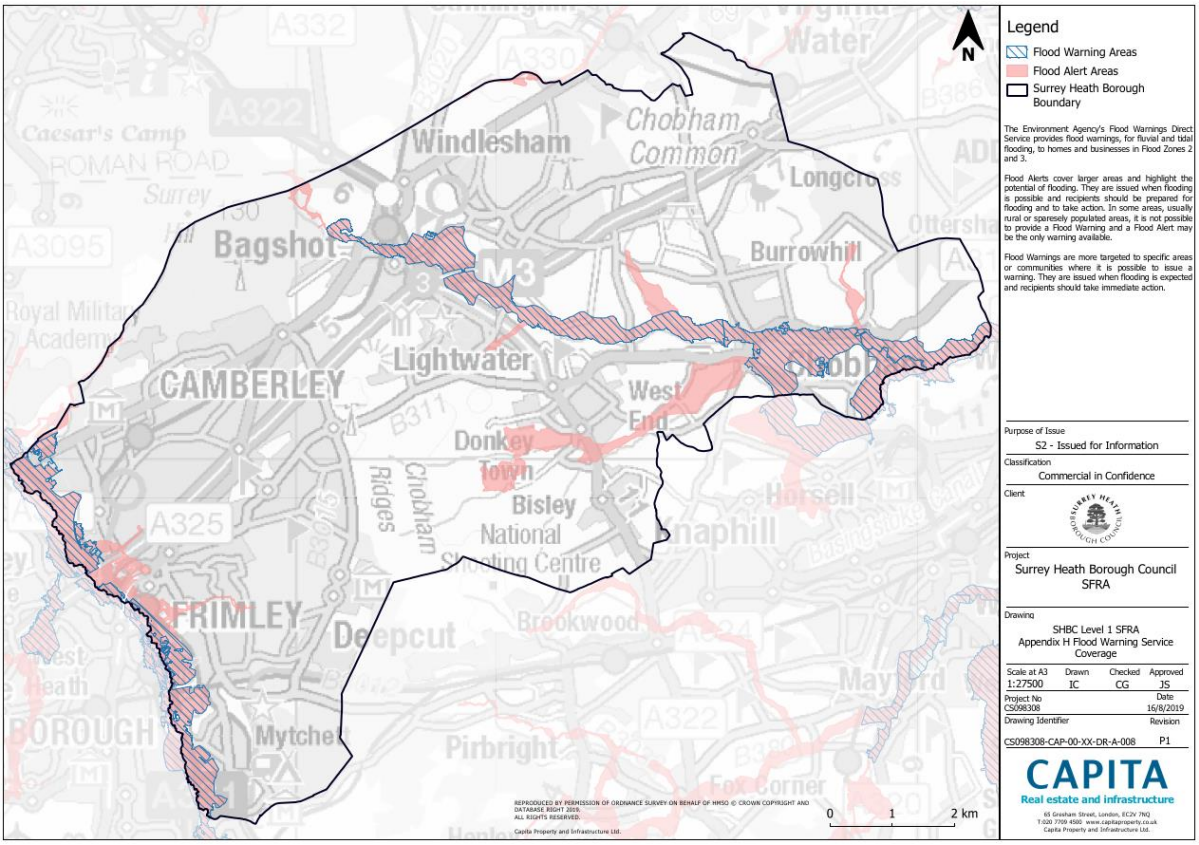
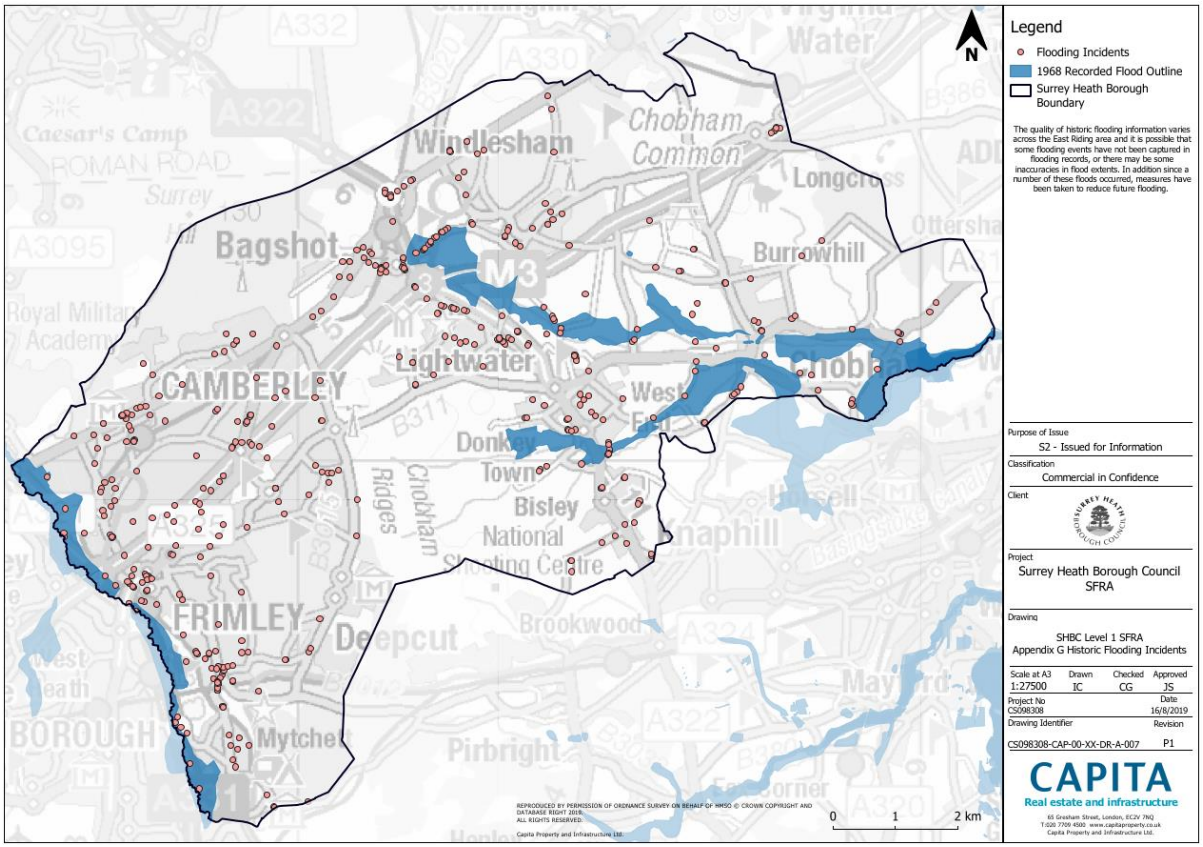



*Figure 9.3: Recorded flooding events*



### Fluvial flood risk

9.2.7 The Draft SFRA summarises the situation as follows:

*"The Environment Agency Flood Map for Planning, and the functional floodplain (Flood Zone 3b) produced for this report show fluvial flood risk is largely from the Main Rivers, including the Blackwater and its tributaries and the Addlestone Bourne.*

*The River Bourne catchment, with its wide floodplains, has large areas at risk. However, much of this is rural, undeveloped land.*

*The River Blackwater catchment and its tributaries flows through more urban areas, resulting in greater risk to individual properties and businesses."*

9.2.8 The Environment Agency Flood Map for Planning shows the extent of flood risk zone 2 – see Figure 9.2 – and flood risk zone 3 within that. The SFRA takes the EA Flood Map a step further in two ways:

- It splits flood risk zone 3 into zones 3a and 3b, where zone 3b is the functional flood plain. This is an important distinction as 'less vulnerable' development (which includes employment and commercial uses) can be appropriate in flood zone 3a (provided that the PPG defined Sequential Test has been passed), and 'more vulnerable' development (which includes housing) is appropriate in flood zone 3a only in exceptional circumstances (i.e. where the PPG defined Exceptions Test is passed), whereas these types of development are not appropriate in flood zone 3b – see Table 9.2.
- It models the effect of climate change on the extent of flood zone 3a (under two scenarios), finding: "Results mostly show a trend of only a small increase in the area of [Flood Zone 3a] in the future compared to the current extent." However, upon closer inspection the predicted future extent of flood zone 3a often extends almost as far as current flood zone 2, and sometimes (rarely) extends beyond current flood zone 2. It follows that there is a need to apply caution when concluding that areas currently falling within flood zone 2 are appropriate for 'more vulnerable' uses, including housing.[210]

  N.B. work has not been completed to model the effect of climate change on flood zone 2 (within which most types of development are appropriate, provided the Sequential Test is passed, but within which 'highly vulnerable' development is only appropriate with the Exceptions Test having been passed).

9.2.9 Table 9.2 presents Table 3 from the Flood Risk PPG (in a simplified form). The key point to note (as noted under Table 3 within the PPG itself) is that the table *"does not show the application of the Sequential Test which should be applied first to guide development to Flood Zone 1, then Zone 2, and then Zone 3"*. Rather, it aims to guide the application of the Exceptions Test, after the Sequential Test has been passed.

*Table 9.2: Table 3 from the Flood Risk PPG (simplified) with a key category of development (housing ) highlighted*

| **Flood Risk Vulnerability and flood zone 'compatibility'** | | | | |
|---|---|---|---|---|
| Flood zone | Highly vulnerable | More vulnerable | Less vulnerable | Water compatible |
| 1 | ✓ | ✓ | ✓ | ✓ |
| 2 | Exception Test required | ✓ | ✓ | ✓ |
| 3a | ✗ | Exception Test required | ✓ | ✓ |
| 3b | ✗ | ✗ | ✗ | ✓ |

[210] See gov.uk/guidance/flood-risk-and-coastal-change#Table-3-Flood-risk-vulnerability

9.2.10 The Draft SFRA includes a settlement-by-settlement discussion of the extent of fluvial flood risk, and also discusses the influence of infrastructure (notably main roads) and the role of flood risk defences.

9.2.11 A final important point to note regarding the extent of flood risk is that watercourses within catchments smaller than 3km$^2$ may not be included in national flood zone modelling (i.e. Figure 9.2). This is one reason why site-specific Flood Risk Assessments (FRAs) are an important input to planning, typically at the planning application stage. There are two implications for the Local Plan:

- Detailed information on flood risk might be sought from promoters of competing sites to inform the process of Local Plan site selection, although this would likely only be a proportionate step at the latter end of the site selection process, once the pool of sites in contention for allocation has narrowed.
- Areas adjacent to unmodelled rivers shown to be at risk of surface water flooding can sometimes be at risk of fluvial flooding in practice.

### Surface Water flood risk

9.2.12 The Draft SFRA draws on the nationally available map of surface water flood risk, and concludes:

*"The [high risk] outline predominantly lies on roads, including the M3 motorway, along watercourse valleys and either side of the railways, particularly around Frimley and Camberley. There are limited number of properties at risk. The [medium risk] outline follows the same flow paths but covers a larger area… so it encroaches on more properties, although the number of properties at risk is still limited. The [low risk] outline covers a significantly larger area again, covering a large proportion of the Borough, but is an exceptionally unlikely surface water flood event."*

9.2.13 The Draft SFRA also examines past events, finding that:

*"Surface water flooding has historically occurred within Surrey Heath. The 2006 and 2007 flood events seen across Surrey Heath were mostly attributed to surface water flooding from overland flow paths, followed by fluvial flooding once the rivers and public/private drainage systems had reached capacity.*

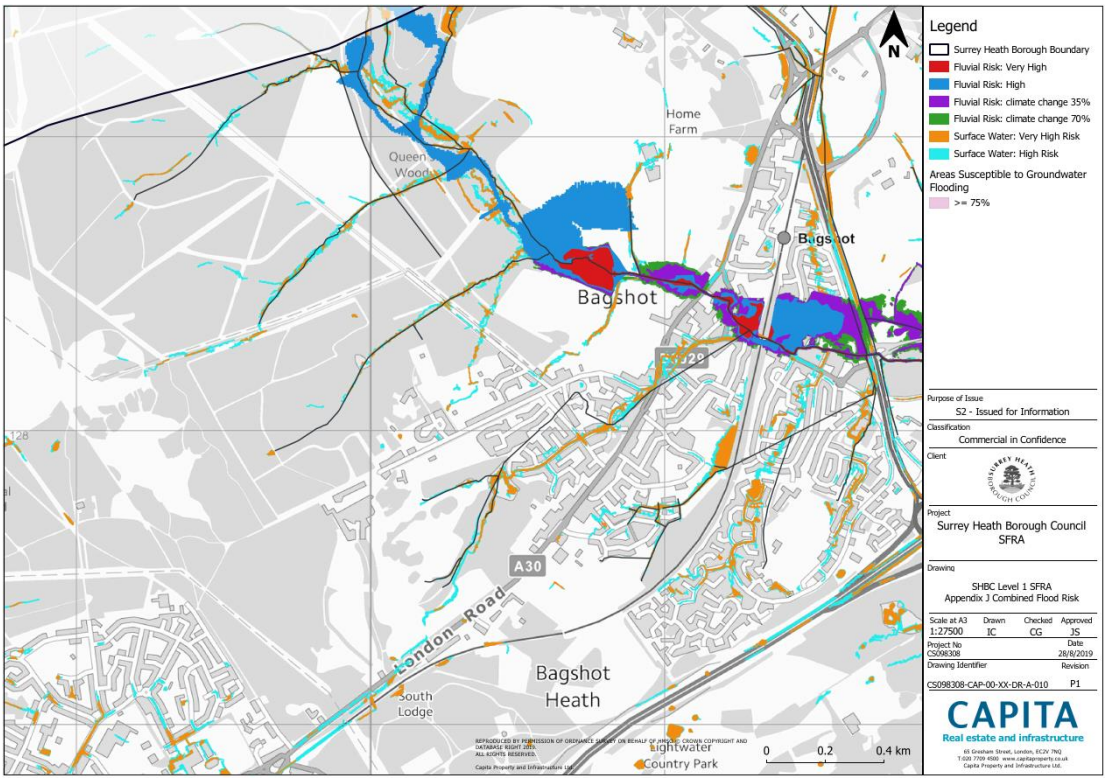
*Historic flooding information, provided by Surrey County Council, shows that surface water flooding has occurred along Station Road near Mimbridge, due to unattenuated runoff. Guildford road (Bagshot), Lightwater By-pass (Broadway Road bridge), Bridge Road (Frimley) and Station Road (Frimley) are also subject to a combination of fluvial and surface water flood risk."*

### Composite fluvial and surface water flood risk maps

9.2.14 The Draft SFRA concludes by presenting a composite map of flood risk within Surrey Heath that serves to highlight that areas of high and medium surface water flood risk should be taken into account as a strategic constraint over-and-above areas of fluvial flood risk. Figure 9.4 shows the mapped output for just one representative part of the Borough. Key points to note are as follows:

- Areas of very high (zone 3b) and high (zone 3a) flood risk are a key constraint to take into account as part of strategic planning, as is the extent of modelled zone 3a under the two climate change scenarios.
- Flood zone 2 is not shown on the map as it is less of a strategic constraint (and, in practice, much of current flood zone 2 will be contained within the modelled future flood zone 3a);
- Surface water flood zones often follow defined water courses (shown as black lines on the map below), or the routes of former water courses, which serves to indicate that the flood risk can in fact be to some degree fluvial. Surface water flood zones are also associated with roads and railways.

*Figure 9.4: Composite flood risk map for one representative part of the Borough*




### Sewer flood risk

9.2.15 Flooding from sewers is the next most significant source of flood risk in Surrey Heath and is a climate change consideration as sewer flooding can be caused by heavy rainfall events.

9.2.16 The Draft SFRA examines the spatial distribution of past sewer flooding events, and summarises the situation as follows:

*"Sewer flooding incidents have been recorded throughout the Borough, mainly in urban areas, such as Camberley and Frimley, where the denser public drainage networks increase the probability..."*

9.2.17 However, concentrations of past sewer flooding events do not necessarily indicate where future sewer flooding is more likely, as the issue that caused the flooding in the past may have been subsequently addressed, e.g. through engineering work. The age of sewer systems is also a factor with a bearing on flood risk, with the Draft SFRA explaining that a new design standard has very recently been implemented; however, there is no readily available dataset to differentiate parts of the sewer network according to age.

9.2.18 Broadly speaking, there is likely to be limited potential to draw upon understanding of spatial variation in sewer flood risk as a strategic constraint when preparing the Local Plan. It will be for the water company (Thames Water) to highlight, through consultation, any site options under consideration that are a particular cause for concern. A more typical situation, however, is that the water company is content for sewer network issues to be addressed at the development management stage (guided by development management policy in the Local Plan).

### Groundwater flood risk

9.2.19 The Draft SFRA explains that current understanding of groundwater risk is limited, but that it is possible to gain a high-level understanding from the Environment Agency's Areas Susceptible to Groundwater Flooding Map (AStGWf). The conclusion reached is that:

*"Most of the study area is at low risk of groundwater flooding due to the underlying sandstone geology. There is an elevated risk of flooding from groundwater close to river valleys, where high water tables and fluvial sand and gravel deposits allow water to easily rise to the surface."*

9.2.20 It follows that there is likely to be relatively little to be gained from examining spatial variation in groundwater flood risk as a strategic constraint when preparing the Local Plan.

### Reservoir flood risk

9.2.21 The Draft SFRA focuses on two areas within the Borough:

- River Valley of the River Blackwater - reservoir flood risk zones are usually smaller than the fluvial flood risk zones, except for at Mytchett and York Town, Camberley, where the risk of reservoir flooding risk zone extends further than the fluvial flooding risk zone. Most of the areas subject to inundation are wetland and parkland areas. However, properties in Mytchett, including those along Mytchett Road, are at risk from flooding from the Mytchett Lake reservoir. The lake itself belongs to the Ministry of Defence; however, the embankment is owned and managed by Surrey County Council. York Town, Camberley and other areas downstream of the confluence of the Cove Brook and River Blackwater are at risk from failure of the Hawley Lake and the Cove Brook FSR infrastructure (outside of the study area).
- River Valley of the Windle Brook and Hale Bourne - the reservoir flooding risk zones are mostly smaller than the fluvial flood risk zones.

9.2.22 It follows that understanding of reservoir flood risk can and should be taken into account as part of spatial strategy-making / site selection, when preparing the Local Plan, albeit recognising that the areas at risk (over-and-above areas that are at risk from fluvial flooding) are very limited, and that the risk of there being a reservoir flooding event in any given year is very low.

### Canal flood risk

9.2.23 The Draft SFRA summarises the situation as follows:

*"Flood risk of the Basingstoke Canal can occur through failure of its embankments. Due to the low probability of this occurring, flood risk from the Basingstoke Canal is considered to be low."*

9.2.24 Heavy rain can be a factor, but flooding events are more likely to result from an underlying structural weakness within the Canal's embankment. It follows that canal flooding is not a significant climate change adaptation concern and is not a strategic constraint to take into account as part of Local Plan preparation.

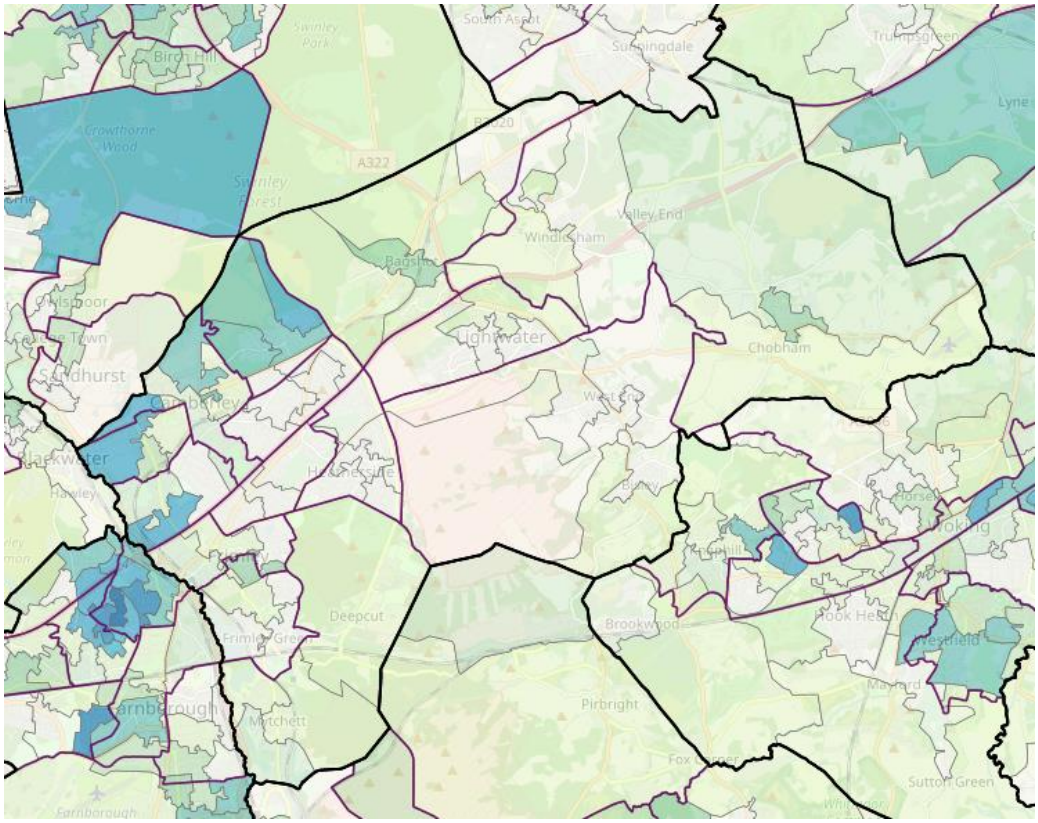
### 'Social' flood risk

9.2.25 Another source of evidence, not examined by the SFRA, is the Social Flood Risk Index (SFRI), which takes into account both flood risk (fluvial and surface water) and the social vulnerability of an area to a flood event. An online mapping tool showing the SFRI is available at: www.climatejust.org.uk/map.

9.2.26 The SFRI looks at the following aspects of vulnerability: Susceptibility; Ability to prepare; Ability to respond; Ability to recover; and Community support. Spatial variation in respect of flood risk vulnerability relates closely to spatial variation in respect of the Index of Multiple Deprivation – see Figure 9.5.

9.2.27 Areas of relative deprivation, where vulnerability to flooding can also tend to be higher, are concentrated in the west of the Borough, and one location that stands-out as being subject to both a degree of relative deprivation and a degree of flood risk is the residential neighbourhood directly to the northeast of the M3/A331 junction, west of the B3411. Homes at the western extent of this area intersect the fluvial flood risk zone, and surface water flood risk affects much of this area. Outside of the main urban area, Bagshot is notable in that a significant number of homes are affected by flood risk, and there is a (minor) degree of relative deprivation.

*Figure 9.5: The Index of Multiple Deprivation (2019)*[211]




## Water resources and water quality

9.2.28 A Water Cycle Study (WCS) was completed for Hart, Rushmoor and Surrey Heath councils (on the basis of a shared housing market area) in 2017. The study is first-and-foremost an assessment of the potential to sustainably accommodate housing growth under various scenarios, i.e. it looks to the future. However, it is appropriate to present a summary of findings here.

*9.2.29* Of particular note is the work through the WCS to examine issues in respect of wastewater management (which is a climate change adaptation consideration as drought and flood scenarios lead to wastewater management challenges and, in turn, a risk of water pollution) and water supply. The study looks forward to 2032 (only) and considers *"four scenarios for proposed future development that are based on an understanding of where development could come forward within the study area."*

### Wastewater management

9.2.30 There are three wastewater treatment works (WwTWs) in the Borough, all of which were examined through the WCS – see Figure 9.6. After having analysed four growth scenarios, the WCS concludes that the Chobham WwTW has capacity ('headroom') to accept increased flow; however, the Camberley and Lightwater WwTWs are more problematic. The WCS finds these two WwTWs to be the most constrained in the study area, in respect of capacity to accept increased flow, and further analysis of water quality serves to highlight that Camberley is the more constrained of the two, in that it may be a challenge to achieve solutions to "*ensure that the increased wastewater flow discharged does not impact on the current quality of the receiving watercourses, their associated ecological sites and also to ensure that the watercourses can still meet with legislative requirements"*. Specifically, Camberley WwTW:

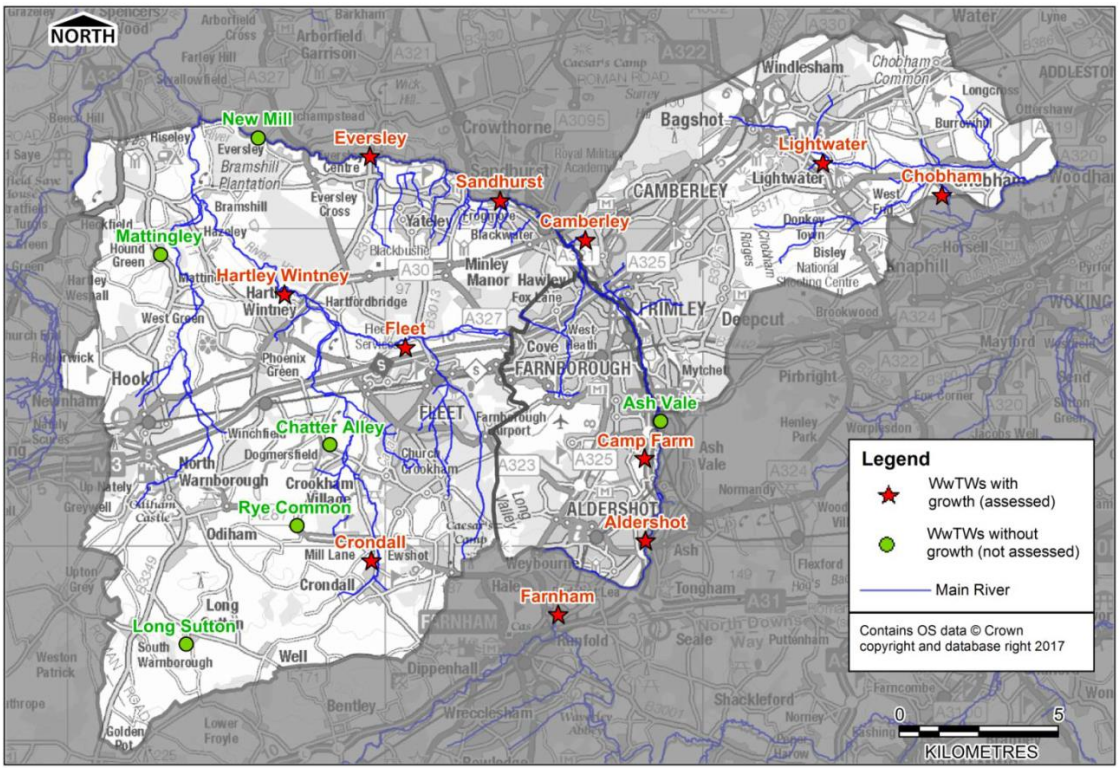
*"… may… require advanced treatment technologies (non-conventional) to ensure future development can be accepted without significantly compromising water quality targets in the River Blackwater. Due to the nature of advanced treatment technologies, they may potentially be expensive and unsustainable. However, the treatment performance of Camberley WwTW is already very good using currently available treatment technologies, suggesting that treatment capacity may not be a barrier to growth..."*

[211] See dclgapps.communities.gov.uk/imd/iod_index.html

9.2.31 More generally, the WCS draws the following conclusion in respect of wastewater treatment:

*"It is recommended each of the local authorities, Thames Water Utilities Limited and Severn Trent Services use the results of this WCS to advise their Local Plans and asset management plans respectively. By working together, this will ensure that as developments come online there is sufficient capacity available locally to ensure all objectives of the Water Framework Directive (WFD) continue to be met."*

*Figure 9.6: Wastewater Treatment Works examined by the WCS*




## Water supply

9.2.32 The headline conclusion of the WCS is as follows:

*"Based on the growth assessed, the WCS has concluded that, allowing for the planned resource management of South East Water's and Affinity Water's Water Resource Zones, the study area would have adequate water supply to cater for growth over the plan period."*

9.2.33 However, the WCS identifies that there are long term limitations on further abstraction from the raw water resources supplying the study area, hence there is a need to ensure that water demand is managed for all new development in order to achieve long term sustainability in terms of water resources.

9.2.34 The WCS sets out *"a pathway for achieving neutrality as far as practicable"* and explores five water neutrality scenarios. The WCS concludes that measures should be taken to deliver the first step on the neutrality pathway, and makes the following recommendations:

- Ensure all housing is water efficient, with new housing development meeting the mandatory national standard as set out in the Building Regulations;
- Carry out a programme of retrofitting and water audits of existing dwellings and non-domestic buildings, aiming to move towards delivery of 15% of the existing housing stock, with easy fit water saving devices;
- Establish a programme of water efficiency promotion and consumer education, with the aim of behavioural change with regards to water use.

### Heat vulnerability

9.2.35 It is difficult to describe the current baseline situation in respect of over-heating risk; however, one available dataset is the Social Heat Vulnerability Index (SHVI), which provides insight into the social vulnerability of an area with respect to a heat-related hazard. The SHVI considers the following aspects of vulnerability:

- Sensitivity - the personal biophysical characteristics which affect the likelihood that a heat wave will have negative health and welfare impacts.
- Enhanced exposure - the physical environment acting to accentuate or offset the severity of a heat wave.
- Ability to prepare - a person or community's ability to prepare for heat-related events.
- Ability to respond - a person or community's ability to respond to heat-related events.
- Ability to recover - a person or community's ability to recover from heat-related events.

9.2.36 An online mapping tool showing the SFRI is available at: www.climatejust.org.uk/map. The mapping tool serves to highlight the Borough's main urban area as being associated with relatively high vulnerability; however, the vulnerability here is judged to be 'average' in the national context.

## 9.3 The baseline scenario

9.3.1 This section considers future climate change and associated risks.

### Projections for future climate change

9.3.2 According to the latest UK Climate Projections (UKCP18), the UK has increased chance of milder, wetter winters and hotter, drier summers. Table 9.3 summarises the temperature and precipitation changes projected for central England by 2070.

*Table 9.3: Summer and winter changes projected for England by 2070*

| Emissions scenario | Rainfall | | Temperature | |
|---|---|---|---|---|
| | Winter | Summer | Winter | Summer |
| Low | 3% drier<br>to 22% wetter | 41% drier<br>to 9% wetter | -0.1ºC cooler<br>to 2.4ºC warmer | No change<br>to 3.3ºC warmer |
| High | 2% drier<br>to 33% wetter | 57% drier<br>to 3% wetter | 0.7ºC warmer<br>to 4.2ºC warmer | 1.1ºC warmer<br>to 5.8ºC warmer |

9.3.3 Additionally, projections show that sea level around the UK will continue to rise to 2100, however the pattern of sea level rise is not uniform with more sea level rise predicted in the south of the country than in the north. This is obviously less relevant to Surrey Heath.

9.3.4 Finally, increased frequency and intensity of weather extremes are projected. More specifically, the frequency of hot spells (whereby daytime temperatures exceed 30ºC for two or more consecutive days) is projected to rise from once every four years in 1981-2000, to four times every year by 2070. Additionally, extreme hourly rainfall intensity is projected to increase by 25% from 1990 to 2070.

9.3.5 In line with national projections, Surrey Heath is likely to experience milder wetter winters, hotter drier summers and increased frequency and intensity of extreme weather, resulting in higher incidence of flooding, heatwaves and droughts. Table 9.4 summarises the specific precipitation and temperature changes projected by UKCP18 for the Thames River Basin, in which Surrey Heath Borough resides.

*Table 9.4: Summer and winter changes projected for the Thames River Basin up until the end of the century*

| Year | Rainfall | | Temperature | |
|---|---|---|---|---|
| | Winter | Summer | Winter | Summer |
| 2040-2059 | 0% - 30% increase | 10% - 30% decrease | 1ºC – 2ºC increase | 1ºC – 3ºC increase |
| 2080-2099 | 0% - 40% increase | 10% - 60% decrease | 1ºC – 4ºC increase | 1ºC – 7ºC increase |

## Climate change risks

9.3.6 In the UK understanding of climate change risks is set out in the CCC Adaptation Sub-committee's Climate Change Risk Assessment, and the associated Evidence Report.[212] The Evidence Report review's 52 possible climate change risks and opportunities, certain of which are of relevant to the Surrey Heath Local Plan. **Appendix I** of this report presents a detailed review in relation to these risks and opportunities.

### Risks to public health from high temperatures

9.3.7 High temperatures will impact on the entire population, but some sectors of the population, including the elderly, can be particularly suspectable. The Heat Vulnerability Index, discussed above, also serves to highlight that urban communities can tend to be more vulnerable than rural communities.

9.3.8 High temperatures will also likely have significant implications for the use of public transport, can impact employee productivity and put a strain on health and social care. Also, poor air quality can be exacerbated by high temperatures, which leads to further public health concerns, and there is also a need to consider the possibility of increased vector borne diseases (i.e. diseases caused by parasites, bacteria or viruses).

### Risks to communities and businesses from flooding

9.3.9 Increased rainfall and storminess under climate change scenarios will lead to more frequent and more extreme flooding events. A first port of call is the Strategic Flood Risk Assessment (SFRA), discussed above, and in particular work to model the effect of climate change on the extent of flood zone 3a, which is the flood risk zone within which housing is acceptable only in exceptional circumstances.

9.3.10 However, it is important to recognise that there are a range of uncertainties in respect of flood risk under climate change scenarios. For example, there is a risk that changes to land management practices in response to climate change could lead to increased rates of surface water run-off and, in turn, decreased time between rainfall events and river levels peaking, leading to increased flood risk.

### Risks to infrastructure

9.3.11 Infrastructure including bridges, railways, pipelines and sewers can be damaged by storms and flooding events, and infrastructure including rail, road, ICT and energy infrastructure can be damaged, or fail to operate at full capacity, due to high temperatures. Drought also impacts hydro-electric power generation.

9.3.12 Both droughts and storm events can also have major implications for effective wastewater management, that is wastewater management in-line with the achievement of water quality objectives. Specifically, the flow capacity of a WwTW, without sufficient capacity headroom, can be at risk of breach during a storm event; or, alternatively, during a drought / low flow period there can be a risk of normal discharges breaching water quality standards in the receiving water course. These matters are explored through the Surrey Heath WCS, discussed above.

### Risks to farming and forestry

9.3.13 Farming will be impacted by changes in climate and weather patterns and an increase in extreme weather events. Increased risk of wildfires is a concern for many upland moorland areas, and is also a concern in Surrey Heath given the extent of heathland and former heathland now under plantation forestry.

[212] See theccc.org.uk/tackling-climate-change/preparing-for-climate-change/uk-climate-change-risk-assessment-2017/

9.3.14 Over the long term there is also a need to consider changes to soil structures, and issues of soil erosion due to aridity over summer months combined with heavy rainfall events over the winter months. Soil erosion can, in turn, serve to exacerbate flood risk.

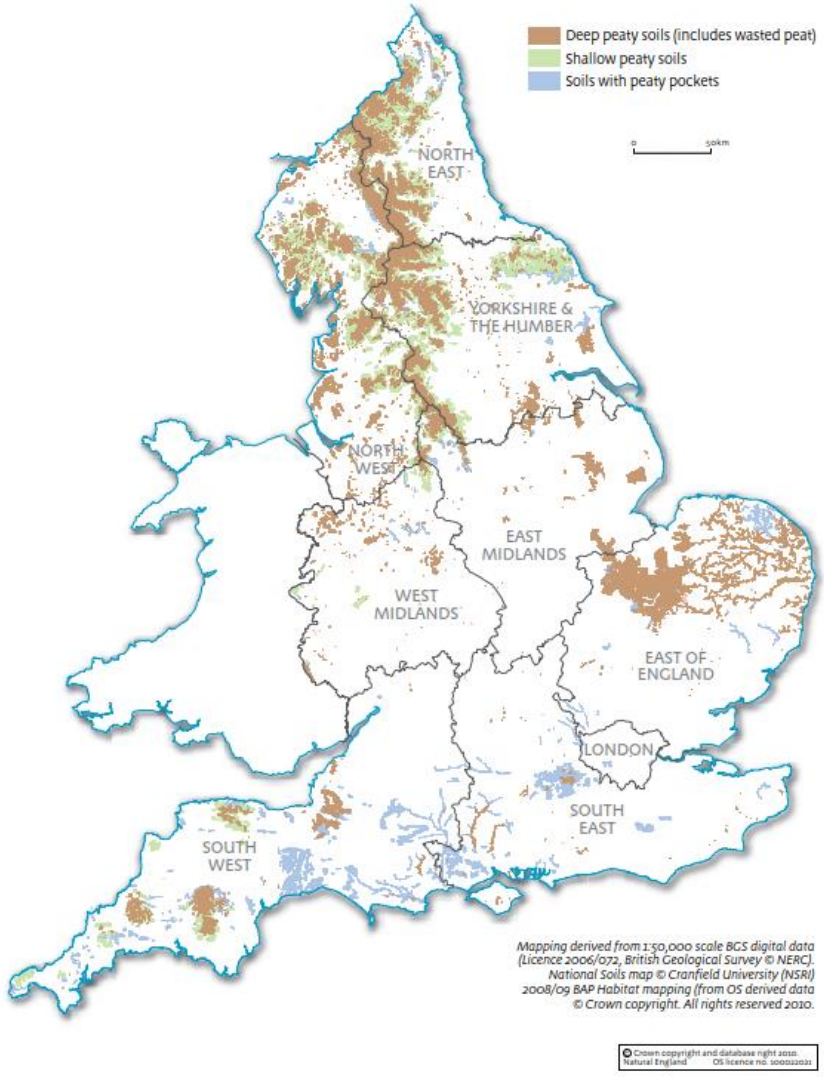
### Risks to the built and natural environment

9.3.15 Geographical shifts to the 'climate envelope' within which species have evolved to exist can impact on species populations, in particular where the habitat does not exist to allow the population to shift with the changing climate space. Extreme weather events can also impact species populations.

9.3.16 A related consideration is impacts to woodland habitats and soils that are carbon stores, and (in the case of woodland in particular) must be able to thrive such that they can continue to sequester carbon from the atmosphere into the future. Loss of carbon stores (through oxidisation), or decreased ability to sequester carbon from the atmosphere, will lead to an increase in atmospheric $CO_2$ and, in turn, increased climate change. Loss of peatland is a particular concern, as peat is a major store of carbon, and is a consideration for Surrey Heath, given the extent of lowland heathlands associated with the Thames Basin Heaths (TBHs) – see Figure 9.7.

9.3.17 Finally, high temperatures and more extreme weather poses a risk to valued structures and the historic environment. There will be a need to retrofit much of the existing building stock nationally in order to adapt to high temperatures in particular, and this can be difficult with respect to older buildings.

*Figure 9.7: Peatland in the UK (showing the TBHs as an area of 'soils with peaty pockets')*[213]




[213] See publications.naturalengland.org.uk/publication/30021

# 10 Review of intervention options

## 10.1 Introduction

10.1.1 The aim of this section is to review potential Local Plan interventions that might feasibly be taken forward through the Surrey Heath Local Plan, subject to further consideration of cumulative implications for Local Plan viability and the achievement of wider Local Plan / sustainable development objectives.

10.1.2 The review is presented under thematic headings established on the basis of the context and baseline review presented above. The order of thematic headings reflects a broad understanding of importance / potential to contribute to adaptation and resilience. The headings are:

- Spatial strategy;
- Masterplanning and urban design; and
- Development management policy

## 10.2 Spatial strategy

10.2.1 Spatial strategy-making and site selection is a crucial means by which the Local Plan can address: flood risk; matters relating to biodiversity, natural capital and/or ecosystem service provision (including by protecting agriculturally productive land); and matters relating to water resources and water quality.

### Flood risk

10.2.2 A clear regime for avoiding development in flood risk zones is presented within the NPPF and the PPG yet building new homes in locations where they are at risk from flooding persists as an issue nationally.[214]

10.2.3 There is a need to take a sequential approach to distributing development and selecting sites for allocation. The reason for doing so relates not only to seeking to avoid any flood risk impacting on the people, property or businesses that are flooded, but also recognising that buildings in a flooded area can reduce the capacity of that area to store water, and therefore increase flood risk downstream.

10.2.4 In the Surrey Heath context, this means directing development to fluvial flood zone 1 where possible, followed by flood zone 2, followed by flood zone 3a 'climate change scenario' (as understood from the SFRA), followed by flood zone 3a (i.e. land shown to comprise flood zone 3a now, as understood from the SFRA) followed by flood zone 3b (as understood from the SFRA). As explained by the PPG: *"The aim should be to keep development out of medium and high flood risk areas (Flood Zones 2 and 3) and other areas affected by other sources of flooding where possible."*

10.2.5 A sequential approach to distributing development and selecting sites for allocation also means considering sources of flood risk other than fluvial flood risk, in particular surface water flooding. As stated by the PPG: *"Within each flood zone, surface water and other sources of flooding also need to be taken into account in applying the sequential approach to the location of development."*

10.2.6 The means of demonstrating a sequential approach is through application of the Sequential Test, in line with the PPG. In some cases, passing the Sequential Test, i.e. demonstrating that there is not an alternative site at lower risk of flooding, can be sufficient to justify allocation of a site in a flood risk zone. However, in other instances it is only possible to allocate a site in a flood risk zone having passed both the Sequential Test and a further PPG-defined test, namely the Exceptions Test. Understanding of whether the Exceptions Test is required comes from Table 3 of the Flood Risk PPG, which is reproduced above, as Table 9.2.

[214] See theguardian.com/environment/2020/feb/23/more-than-11000-homes-to-be-built-on-land-at-high-risk-of-flooding

10.2.7 The approach summarised above is also explained across paragraphs 155 to 159 of the NPPF, with paragraph 160 going on to introduce the scope of the Exceptions Test. Specifically, it explains that the Exceptions Test should be informed by detailed work to understand both the specific nature of flood risk, having taken account of site-specific proposals, and the benefits that the development would bring (that might outweigh any residual flood risk).

10.2.8 An inherent challenge for Local Plans, when undertaking either the Sequential Test or the Exceptions Test, relates to limited understanding of site-specific proposals, or understanding that is inconsistent across the numerous site options being examined. Notably:

- When undertaking the Sequential Test there may be a lack of consistent understanding in respect of the potential to leave land at risk of flooding within a site undeveloped as open / green space;
- When undertaking the Exceptions Test there may a lack of consistent understanding in respect of the potential to masterplan and design the development so as to avoid flood risk, for example through the use of Sustainable Drainage Systems (SuDS) and/or by avoiding vulnerable uses at ground floor level.

10.2.9 The implication is that there is a need to take a precautionary yet proportionate approach through Local Plans, in the knowledge that further work can be undertaken at the planning application stage. The NPPF recognises that it is appropriate to allocate sites through Local Plans ahead of detailed work being completed at the planning application stage, with paragraph 163 setting out a list of detailed matters that must be considered through site specific flood risk assessments in support of planning applications.

10.2.10 Finally, paragraphs 155 to 161 of the NPPF, which deal with flood risk and Local Plans, also notably raise two further considerations:

- *Cumulative impacts in, or affecting, local areas susceptible to flooding* – it is inherently challenging, in practice, to suggest that any given development, let alone developments in-combination, will lead to increased downstream flood risk, given the potential to design developments so as to store water and slow surface water runoff. However, it can be possible to tentatively identify areas where this might be an issue, taking account of topography and gradients; also SuDS suitability is a consideration (see discussion of SuDs below).
- *Safeguarding land from development that is required, or likely to be required, for current or future flood management* – such land will typically be in flood zone 3b, where there is limited potential for development, but can potentially be in flood zone 3a, where there is greater potential for development (as discussed), hence there can be merit in safeguarding through the Local Plan.

  A related consideration is the need to fund such flood management interventions and, in particular, new Flood Storage Areas (FSAs) in the flood plain, which can be a spatial strategy / site selection consideration, in that strategic growth in proximity may be able to fund interventions of this nature, in particular where the effect is to create a new area of open / green space that is of recreational value. FSAs are discussed further below.

## Planning for biodiversity, natural capital and ecosystem services

10.2.11 A central principle of the 25 Year Environment Plan is the need for the planning system to deliver biodiversity and environmental net gains: *"Current policy is that the planning system should provide biodiversity net gains where possible. We will explore strengthening this requirement for planning authorities to ensure environmental net gains across their areas…"*

10.2.12 This is an important climate change adaptation consideration, as delivering gains now will result in ecosystems and landscapes more resilient to climate change and is relevant to spatial strategy and site selection. The first step in any process to deliver net gains is to avoid losses.

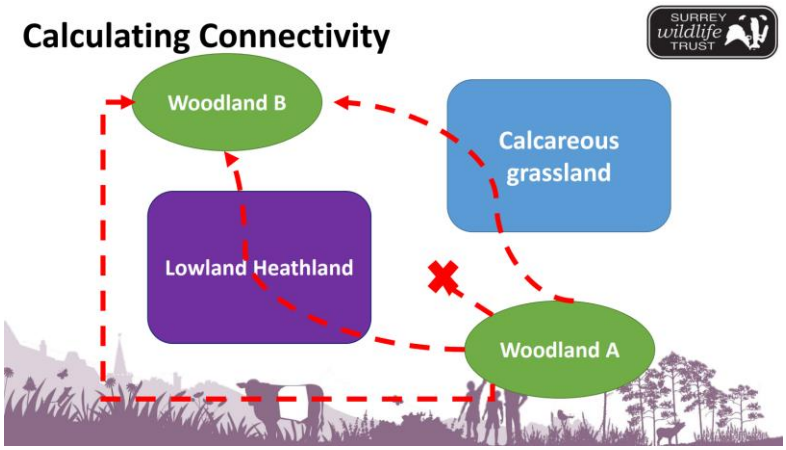
### Avoiding loss of biodiversity

10.2.13 There is a well-established and extensive network of internationally, nationally and locally designated sites within the Borough, which must be protected and enhanced where possible.

10.2.14 Beyond this, there is also a need to avoid development impacting on non-designated land that is of biodiversity value in and of itself, and which contributes to ecological connectivity and green infrastructure locally. Key considerations include:

- An important starting point is the nationally available data set showing areas of priority habitat (see magic.gov.uk), taking account of spatial patterns and clustering that might serve to indicate ecological connectivity between patches, which in turn suggests that intervening land may perform a role in respect of enabling that connectivity. Natural England's National Habitat Networks map serves to highlight (some) areas of non-priority habitat that might prove to be of particular importance to connectivity.[215]
- At a more strategic scale, the map of Surrey Biodiversity Opportunities Areas is an excellent resource that serves to highlight the following strategic ecological networks intersecting Surrey Heath Borough:[216] Chobham Common North & Wentworth Heaths; Chobham South Heaths; Colony Bog, Bagshot Heath & Deepcut Heaths; Ash, Brookwood & Whitmoor Heaths; Camberley & Broadmoor Heaths; Blackwater River; and River Wey and Tributaries (Addlestone Bourne in Surrey Heath).
- The Surrey Wildlife Trust is undertaking work to quantify the extent to which all areas of designated and non-designated land contribute to ecological connectivity using GIS modelling – see Figure 10.1.[217]

*Figure 10.1: Introducing of the Surrey Wildlife Trust Model*




## Avoiding loss of agricultural land

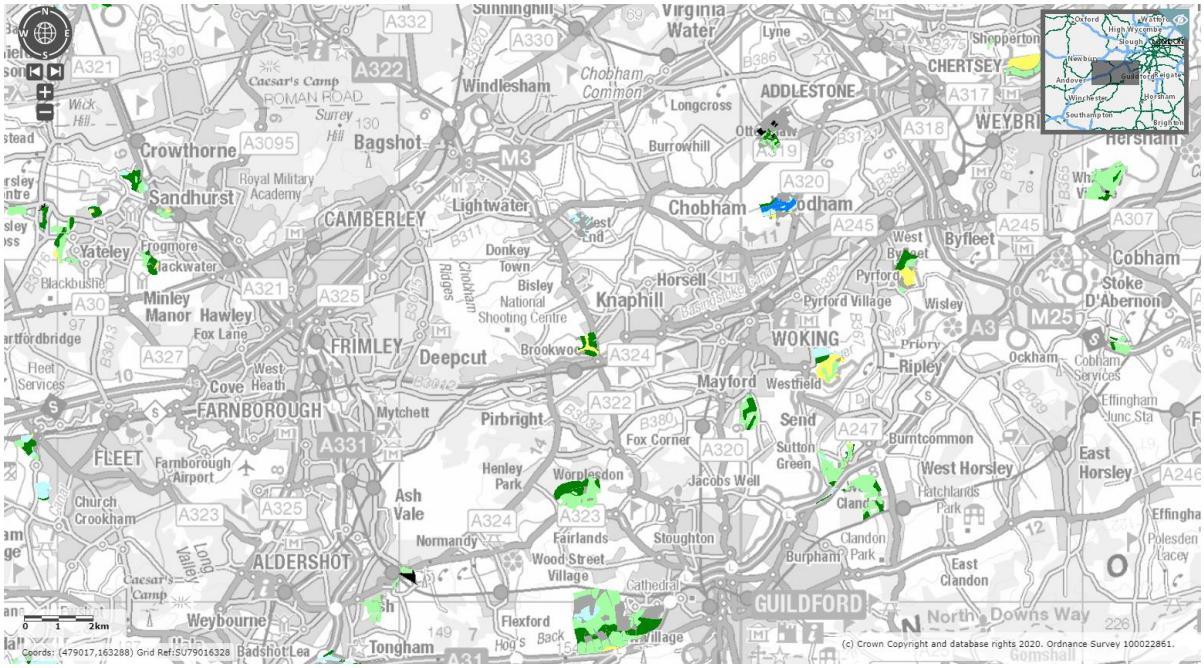
10.2.15 The predicted impacts and uncertainties associated with climate change serve to emphasise the importance of maintaining the national resource of agricultural land, and, in particular, that which is 'best and most versatile' (BMV), which the NPPF defines as being of grade 1, grade 2 or grade 3a quality.

10.2.16 The nationally available 'Provisional Agricultural Land Classification' dataset serves to highlight that Surrey Heath is associated with very limited BMV agricultural land, reflecting the heathland and former heathland soils; however, this dataset is very low resolution, and does not differentiate between grades 3a and 3b.

10.2.17 Another dataset is also available that classifies the quality of agricultural land with much greater accuracy, on the basis of field surveys, but this dataset is very patchy, with almost no land in Surrey Heath included – see Figure 10.2. There is the potential to undertake a desktop study to classify the quality of all agricultural land within a given area (e.g. for the entirety of Surrey Heath) with a degree of accuracy.

[215] See data.gov.uk/dataset/0ef2ed26-2f04-4e0f-9493-ffbdbfaeb159/national-habitat-networks-england
[216] See surreynaturepartnership.org.uk/our-work/
[217] See surreynaturepartnership.files.wordpress.com/2020/04/paper-a_connectivity-model-update-presentation_jan2020.pdf

*Figure 10.2: Agricultural land across the sub-region for which detailed data is available on quality (where blue and dark green indicates land that is of 'best and most versatile' quality)*[218]




## Achieving net gains

10.2.18 The recently published Environment Bill makes provision for mandatory Biodiversity Net Gain as part of development proposals, and the development of Local Nature Recovery Strategies as a spatial planning tools to guide planning for net gain. The aim is to avoid a piecemeal approach to biodiversity net gain.

10.2.19 The Surrey Nature Partnership recently published a position statement on "Surrey in the national Nature Recovery Network",[219] serving to highlight that the BOAs are a robust starting point for spatial targeting, but that there is a need for further work. This serves to highlight the potential for SHBC to undertake work to identify opportunity areas where habitat creation and enhancement work might most effectively be targeted. In turn, there can be consideration given to the possibility of locating housing growth in proximity to these opportunity areas, such that new residents can benefit from the 'ecosystem services' generated by new/enhanced habitat, thereby creating an incentive for the development industry to invest.

10.2.20 With regards to planning for environmental net gain, understanding implications for Local Plans is at a relatively early stage; however, it is well understood that there can be opportunities for targeted development to deliver flood risk enhancement benefits. In particular, strategic scale development can lead to funds that enable or facilitate river restoration/enhancement schemes, and potentially Flood Storage Areas (FSAs), that reduce down-stream flood risk (alongside delivery of wider ecosystem services, typically to include recreational opportunity). This is potentially the primary means by which spatial strategy-making / site selection can contribute to Natural Flood Management (NFM), which is a major focus of land management efforts nationally,[220] including within the Thames catchment.[221]

10.2.21 There are not currently any FSAs recognised by the Environment Agency in Surrey Heath; however, there is one nearby in Rushmoor, namely the Cove Brook FSA, which is designed to store 95,000m3 of water during flood events.[222] The Thames Catchment Flood Management Plan (2009) notably identifies that the Upper and Middle Blackwater is an "Area of low, moderate or high flood risk where flood risk is being managed effectively but where **further actions may be needed to keep pace with climate change**" (emphasis added).

[218] See the Post 1988 Agricultural Land Classification dataset at www.magic.gocv.uk (under Landscape)
[219] See surreynaturepartnership.files.wordpress.com/2020/02/surrey-in-the-national-nrn_final_snp_feb-2020v.2.pdf
[220] See catchmentbasedapproach.org/learn/what-is-natural-flood-management/
[221] See gov.uk/government/groups/thames-regional-flood-and-coastal-committee
[222] See rushmoor.gov.uk/CHttpHandler.ashx?id=14785&p=0 and ovebrookgreenwaygroup.co.uk/who-we-are/history/

### Water resources and water quality

10.2.22 As has been discussed, water supply, wastewater and water quality are all key climate change adaptation considerations, recognising that climate change is likely to result in major changes to the rainfall regime and, in turn, surface water and river flows. The primary spatial strategy / site selection related consideration is potentially in respect of directing growth to locations where there is existing capacity at the wastewater treatment works serving the area, or the potential to deliver capacity in a timely manner.

### Other matters

10.2.23 There are also other means by which spatial strategy and site selection can help to avoid the climate change related risks discussed above, and support adaptation and resilience. For example, spatial strategy and site selection can assist with reducing the urban heat island effect, and ensuring communities have access to high quality green infrastructure.

10.2.24 Also, as discussed, spatial strategy and site selection is a key means of supporting a shift to more decentralised heat and power generation, which is an adaptation consideration, in that:

- a diversified supply will lead to increased resilience to extreme weather events, and decreased risk of outages; and
- a shift from gas boilers to heat pumps in combination with high fabric/efficiency standards will reduce the amount of waste heat that is generated and rejected to the local microclimate.[223]

## 10.3 Masterplanning and urban design

10.3.1 The key section within the **National Design Guide** is that on "Resilience", which explains:

- "Well-designed **places**… contribute to community resilience and climate adaptation by addressing the potential effects of temperature extremes… increased flood risk and more intense weather events…"
- "Well-designed **buildings** make the most of passive design strategies to minimise overheating and achieve internal comfort. These include: the layout and aspect of internal spaces; insulation of the external envelope and thermal mass; management of solar gain; and natural ventilation."
- "Well-designed **public and open spaces** incorporate planting, structures and water for comfort. They create shade and shelter for their users… [and] contribute to reducing the 'heat island' effect."
- "Well-designed places have **sustainable drainage systems**… and make use of 'green' sustainable drainage systems and natural flood resilience wherever possible...."

10.3.2 With regards to the **Building for Life** criteria, the key criterion is: *"Site and its **context** - does the scheme take advantage of existing topography, landscape features (including water courses), trees and plants, wildlife habitats, existing buildings, site orientation and microclimate?"*

10.3.3 Another key recent source of guidance is **Living with Beauty** (2020).[224] The report does not discuss climate change explicitly, but does include a section dedicated to "Re-greening towns and cities", which is a climate change adaptation consideration, given the potential for greenspace and shading within urban areas to counter the urban heat island effect, and also attenuate flood risk.

10.3.4 More broadly, the report includes a major focus on the links between spatial strategy / site selection on one hand and masterplanning / urban design on the other, finding that that the planning system *"places too much focus on development control and not enough on plan-making."* The report suggests a need to:

- Embed place-making from the outset, before any decisions are made about allocating land, including by providing a clear indication of the required scale and design features, particularly on strategic sites;
- Support area-based masterplanning rather than piecemeal site-by-site planning; and

[223] Switching to Net Zero energy use buildings would reduce the average summer UHI magnitude in London by around 15%, see assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/7604/2185850.pdf
[224] See gov.uk/government/publications/living-with-beauty-report-of-the-building-better-building-beautiful-commission

- Think long-term as well as medium-term: "We understand and respect why the government has increased the focus on five-year land supply… However, a longer time frame is necessary when thinking about new settlements, urban extensions and infrastructure investment…"

10.3.5 It is inherently challenging for Local Plans to consider masterplanning and design options at the same time as spatial strategy and site options; however, there is a need to take steps to do so for strategic sites and growth locations, perhaps most notably **Camberley town centre**. A fundamental consideration is invariably in respect of balancing the objective of maximising development densities in those locations that are well-connected and more broadly suitable for development (also the related objective of achieving economies of scale, which can deliver climate change benefits) with the competing objective of ensuring sufficient space for other uses including greenspace. Tall buildings can enable both higher densities and extensive space for other uses, but can give rise to their own issues, e.g. in respect of solar gain. The Living with Beauty report favours mid-rise over tall buildings (Figure 10.3).

*Figure 10.3 "We need to develop more homes within mixed-use real places at 'gentle density'"*


# 10.4 Development management

10.4.1 As a truly cross-cutting issue it is challenging to set policy for climate change adaptation; however, there are certain key policy matters that are commonly considered under the heading of adaptation.

## Water efficiency

10.4.2 Following the 2015 Written Ministerial Statement on Planning defined there is only one option for Local Plans in respect of setting water efficiency requirements for new homes that exceed the baseline requirement of the Building Regulations, which is a requirement to achieve 125 litres per person per day. Specifically, there is the potential to implement the 'optional' standard of 110 litres per day per person. This is the approach taken by all neighbouring local authorities (or proposed to be taken through emerging Local Plans) other than Windsor and Maidenhead and, in practice, is the approach typically taken through most Local Plans in the water stressed South East of England. It is typically the case that policy does not seek to specify means of achieving water efficiency, although the emerging Runnymede Local Plan does state support for rainwater harvesting techniques where feasible. Both the Guildford Borough and Reading Borough SPDs provide further details on potential means of achieving water efficiency, which principally fall under the headings of minimising use, rainwater harvesting and greywater recycling.

## Sustainable Drainage Systems (SuDS)

10.4.3 SuDS are a national requirement for major development,[225] but there is the potential to elaborate through Local Plan policy on the types of development that require SuDS, for example:

- Bracknell – "Major development proposals and developments in areas at risk of flooding from all sources, both now and in the future, identified in the latest SFRA…"
- Guildford – "All development proposals are required to demonstrate that land drainage will be adequate and that they will not result in an increase in surface water run-off. Priority will be given to… SuDS…"
- Hart – "Development will be supported provided that it incorporates SuDS where appropriate."
- Reading – "All major developments must incorporate SuDS… Smaller schemes are encouraged to incorporate SuDS, where possible. Runoff rates should aim to reflect greenfield conditions..."
- Runnymede – "Development proposed will be required to attenuate surface water run-off so that the run-off rate is no greater than the run-off prior to development taking place or, if the site is previously developed, development actively reduces run-off rates and volumes. All new development is required to ensure that SuDS are used for the management of surface water unless… inappropriate."

10.4.4 There is also the potential to guide the approach to SuDS locally, for example:

[225] Paragraph 079 (Reference ID: 7-079-20150415) of the Flood Risk PPG

- Guildford – "Proposals should have regard to appropriate mitigation measures identifies in the Guildford Surface Water Management Plan or Ash Surface Water Study."
- Reading – "Schemes should ensure that the movement of water through vertical infiltration as well as horizontal run-off does not worsen contamination effects. Wherever possible, SuDS provision should maximise ecological benefits, link into the existing Green Network, incorporate tree planting and landscaping and avoid damage to existing significant trees, including through… hydrology."
- Wokingham – "Incorporate measures set out in the Wokingham SuDS Strategy… [and] avoid the use of underground tanks…"

10.4.5 SuDS strategy is a focus of the Surrey Heath SFRA (2019), as part of which there is a review of the Surrey County Council SUDS Design Guidance (2019).[226] The SFRA also goes through a process to understand locations within the Borough where the ability to deliver infiltration SuDS (i.e. drainage to the ground, which is the preferred SuDS technique, ahead of drainage to a water body or sewer) is constrained on account of geology or another factor. This spatial understanding should feed into Local Plan site selection.

## Heat risk

10.4.6 Important precedent is being set through the new London Plan (Intent to Publish Version, 2019), where policy is set to require proposals to take steps in accordance with the following cooling hierarchy: 1) Reduce the amount of heat entering a building through orientation and other steps; 2) Minimise internal heat generation and heat within the building; 3) Provide ventilation – with a preference for passive ahead of mechanical; and then 4) Provide active cooling systems. Overheating should not be seen only as a building design consideration, but also a consideration for masterplanning, for example tree planting or use of light coloured high albedo materials in landscaping. Also, an integrated approach must be taken, notably integration with air quality assessments (e.g. ensuring careful assumptions are made regarding whether windows will be open for ventilation or closed for air quality reasons).

## Other matters

10.4.7 Other matters often covered through development management policy under the banner of climate change adaptation include:

- Building layout, orientation and design – for example, the Reading Borough Sustainable Design and Construction SPD (2019) gives detailed guidance in respect of: solar gain, ventilation, thermal mass, insulation, green roofs and living walls, which can all contribute to avoiding over-heating.

  There are clear crossovers here with policy requirements in respect of thermal efficiency / high building fabric standards aimed at minimising need for heating and cooling, with resultant carbon emissions. There is a need to apply caution in order to avoid the need for summer over-heating on the one hand, whilst minimising the need for winter heating on the other hand.

  Flexibility of building design – buildings should be designed from the outset to be flexible to accommodate changing needs including in respect of climate change. Again, there is a crossover here with the matter of taking a whole life-cycle approach to minimising embodied carbon emissions.
- Flood risk – there is limited room for manoeuvre in respect of setting development management policy on flood risk, in light of the NPPF and PPG; however, one matter to explore could be in respect of considering the flood risk implications of changes to land management practices, e.g. farm diversification schemes. In practice this may mean considering extending the scope of schemes required to submit a flood risk assessment and/or surface water management plan.
- Greenspace – there is a need to consider that policy requirements in respect of achieving a Biodiversity Net Gain may not lead to intended benefits when applied to brownfield sites, where the current baseline biodiversity value is very low. In such areas, an Urban Greening Factor (UGF) approach can be a more suitable method of consistently delivering multifunctional green space, that also provides an increase in biodiversity. An Urban Greening Factor approach requires a developer to include a certain amount of greening in all development in order to deliver a local need, e.g. urban cooling, flood alleviation.[227]

[226] See surreycc.gov.uk/people-and-community/emergency-planning-and-community-safety/flooding-advice/more-about-flooding/suds-planning-advice
[227] See london.gov.uk/what-we-do/environment/parks-green-spaces-and-biodiversity/urban-greening

- Severe weather – there is the potential to require severe weather management plans as part of planning applications for potentially vulnerable developments, including for health and social care community infrastructure and historic buildings. Such management plans might involve (Wamsler and Brink (2014):
  - Hazard reduction and avoidance – to limit or avoid exposure to current and future hazards;
  - Vulnerability reduction – to reduce current and future vulnerability to hazards;
  - Preparedness for response – to provide functional and flexible mechanisms and structures;
  - Coping during crisis – to provide short-term solutions to mitigate harm during a hazard; and
  - Preparedness for recovery – mechanisms and structures for disaster recovery.
- Trees and landscaping – this is a focus of the Reading Borough SPD, which proposes *"A two pronged approach… Firstly, applicants will be expected to demonstrate how their landscaping plan has taken into consideration the impacts of climate change with regards to their species selection, location of planting and in terms of the management of the landscaping. Secondly, applicants should ensure that trees and landscaping play a role in helping to mitigate the impacts of climate change through integration of planting within SuDS provision as opposed to a separate provision…"* There is a crossover here with matters relating to supporting afforestation and tree-growth as a means of carbon sequestration. Also, there is a need to recognise that urban greening can lead to high water usage.

# 11 Conclusion of Part 2

11.1.1 This part of the report has examined the context to taking climate change adaptation steps through the Local Plan; the baseline situation in respect of climate change risks; and how this baseline situation might be improved upon, including through Local Plan interventions, if Surrey Heath is to make a full contribution to national adaptation objectives, albeit recognising that the Local Plan will need also need to balance wide ranging and sometimes competing objectives. Key considerations for the Local Plan relate to:

- **Flood risk** – there is a need to understand and avoid flood risk zones and also take steps in support of natural flood management, which involves slowing the flow of water within the catchment and supporting flood storage areas within floodplains. Furthermore, there is a need to consider the vulnerability of those parts of the Borough that intersect a flood risk zone, in particular where flood risk affects infrastructure or a community that is associated with a degree of relative deprivation (and there is a need to question whether there is a correlation between flood risk and relative deprivation). There are implications for spatial strategy / site selection, masterplanning / urban design and the establishment of development management policy. There are also implications for wider council initiatives, e.g. regeneration-related.
- **Over-heating / thermal comfort** – the Borough includes a densely populated urban area where there will be a degree of urban heat island effect, and there is a crucial opportunity to address this risk through the regeneration of Camberley town centre. There should be consideration given to matters including: development densities and building heights, including so as to ensure space for green infrastructure; wider matters relating to urban design, including in respect of urban greening and shading (including green roofs); and building design, e.g. in respect of orientation. There is also a need to support a shift to the electrification of heat, thereby minimising the impact of waste heat on microclimates.
- **Water resources and water quality** – a primary consideration is the need to direct development in such a way that pressure on wastewater treatment works is minimised. With regards to water supply, whilst the South of England is subject to water stress and likely to experience more droughts in the future, there are limited implications for spatial strategy, i.e. spatial strategy options will likely perform broadly on a par. The primary water supply consideration for the Local Plan is in respect of minimising demand through water efficient building design, which is primarily a matter for Borough-wide development management policy, although there can also be the potential to set site specific policy, and it can be the case that the opportunity is greatest at strategic sites.
- **Planning for natural capital and ecosystem services** – there is a need to ensure functionally robust and resilient ecosystems, which will be able to continue providing 'ecosystem services' – e.g. in respect of flood risk attenuation – into the future under climate change scenarios. Avoiding the loss of 'best and most versatile' agricultural land is a related consideration. There are major implications for spatial strategy, recognising that whilst development can impact negatively on valued natural capital, it can also support delivery of targeted strategic enhancements. There are also implications for masterplanning, urban design and development management policy.

# Part 3: Conclusions and recommendations

# 12 Conclusions

12.1.1 The **baseline situation** in respect of both climate change mitigation and adaptation presents a challenge:

- Mitigation - the baseline decarbonisation trajectory sees the Borough reducing emissions by c.40% by the end of the plan period (2040), whilst there is a need to aim for a c.70% reduction if the Borough is to be on track to fully decarbonise (i.e. deliver net zero emissions) by 2050 in accordance with the national target (or, alternatively, the Borough might set an earlier net zero target date).
- Adaptation - the Committee on Climate Change's Adaptation Sub-committee highlights national preparedness for the effects of climate change as a concern. Surrey Heath is associated with certain notable vulnerabilities (e.g. the urban area may be susceptible to over-heating, there are communities that already fall within the flood risk zone and heathlands are susceptible to wildfires); however, it is not possible to quantify the local baseline situation with any precision.

12.1.2 It follows that there is a **policy gap** to be addressed through the Local Plan, and that objectives relating to climate change mitigation and adaption must be central to Local Plan decision-making. This approach would accord with paragraphs 148 and 149 of the NPPF, which call for a 'proactive' approach through Local Plans and for Local Plans to "*shape places in ways that contribute to radical reductions in emissions".* Place-shaping happens in a number of ways, and at a number of levels, through Local Plans, but it is appropriate to highlight a distinction between:

- **Spatial strategy and site selection** – whilst spatial choices in Surrey Heath are limited by the extent of international biodiversity designations and also the Green Belt designation, there will still be strategic decisions to be made with wide-ranging climate change mitigation and adaptation implications. Perhaps of over-riding importance is the need to factor-in objectives relating to the decarbonisation of transport (i.e. support for public transport, active transport and EVs) and the electrification of heat (i.e. support for heat networks); however, there other also wider ranging other issues and opportunities to be addressed. One further matter is in respect of potentially proactively identifying locations where large-scale solar PV will be supported, including with a view to guiding the efforts of the growing community energy sector.
- **Masterplanning and urban design** – whilst there is a need to avoid being overly prescriptive through the Local Plan, so as to ensure flexibility at the development management stage, masterplanning and urban design options should be considered through the Local Plan for strategic sites as far as possible (given limited time and resources), and ideally prior to a final decision being made on allocation and development scale/density/quantum. This is an important consideration for the regeneration of Camberley town centre, where broad decisions on the approach to growth must be made in light of a need to realise opportunities in respect of heat networks, walking/cycling and green infrastructure, amongst other things, and there is a need to avoid making any decisions that foreclose future options.
- **Development management policy** – a crucial matter is in respect of setting building design and construction standards, with a view to: ensuring thermal efficiency (i.e. minimising the need for winter heating whilst also minimising the risk of summer overheating); supporting the electrification of heating (i.e. a rapid shift from gas boilers to heat pumps); supporting onsite renewable power generation (essentially solar PV); accounting for and minimising embodied carbon and other emissions across the whole life-cycle of development; and supporting climate change adaptation, e.g. in respect of water efficiency and sustainable drainage. The ability of LPAs to require emissions standards that go beyond the requirement of Building Regulations may be curtailed in the near future; however, even if this proves to be the case, there will remain options for Local Plans to explore.

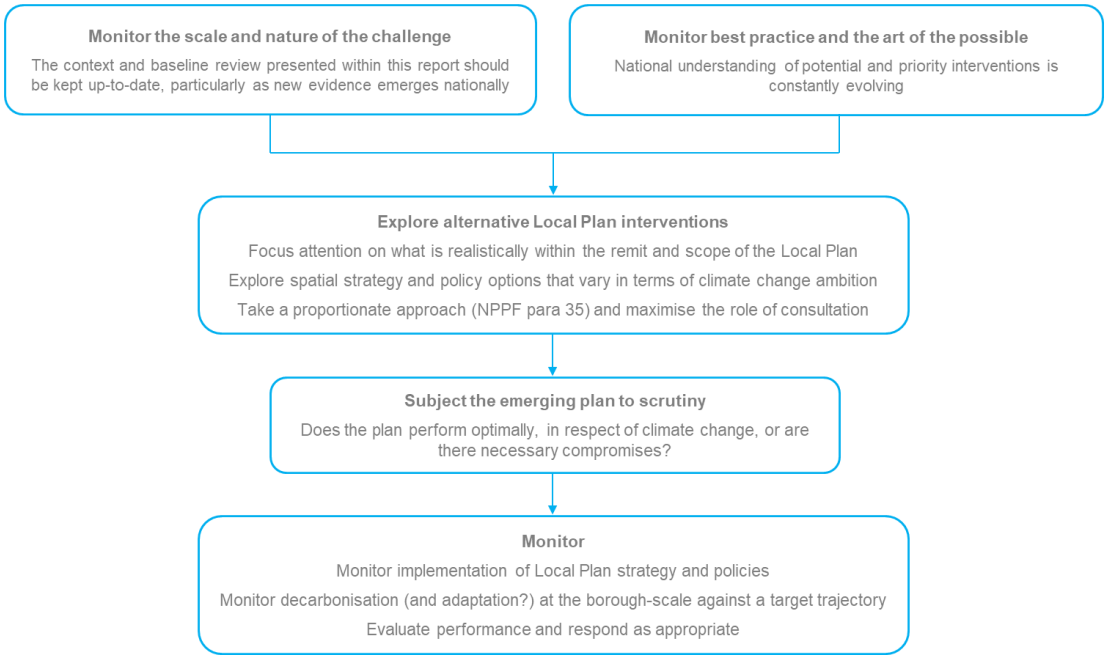
12.1.3 Climate change objectives will need to be 'weighed in the balance', and there will inevitably be a need for **trade-offs** and compromises, which should be made explicit. However, there are also many **win-win** opportunities to be realised. For example, support for high building standards is not only a 'positive' from a climate change perspective, but also from a perspective of supporting health and wellbeing, addressing issues of fuel poverty and supporting jobs and economic growth. There is currently a tension with development viability; however, this will ease as economies of scale are achieved and skills increase.

12.1.4 As such, the potential for the Local Plan to take a highly ambitious approach to addressing climate change can be envisaged; however, it would still not necessarily be the case that the Borough is set on course to achieve net zero by 2050 (or earlier). This is because of the **limited scope of the Local Plan** to affect many aspects of the national and local climate change mitigation and adaptation response, for example (and notably) the Local Plan can do little to support the retrofitting of existing buildings.

12.1.5 One implication is that the Borough Council should take a holistic, **organisation-wide position** on addressing climate change mitigation and adaptation. In line with best practice nationally and locally, the Council should take a leadership role in respect of decarbonising its own operations, and also take steps to support investment in low and zero carbon heat and power generation locally, battery storage and building retrofitting. The Council must also work closely with the County Council and other partner organisations to realise opportunities in respect of the decarbonisation of transport, including support for targeted roll-out of EV charging infrastructure, which will necessitate a holistic consideration of the electricity network. The Council can also take a lead in respect of climate change adaptation, particular in terms of identifying strategic environmental net gain opportunities, e.g. areas of floodplain that might deliver a flood storage area alongside wider ecosystem services, e.g. in respect of access / recreation.

12.1.6 Another implication, of the Local Plan's limited role, is that it is inherently challenging to **test, monitor and evaluate** the performance of the Local Plan in respect of climate change. Whilst Borough-wide emissions can and should be monitored on a regular (e.g. annual) basis by repeating the methodology applied in Section 4.1 of this report, or an equivalent methodology, it will not be possible to attribute observed rates of decarbonisation directly to the Local Plan. It follows that there is a need to give careful consideration to the matter of how best to test, monitor and evaluate the climate change performance of the Local Plan.

*Figure 12.1: Next steps in the process of Local Plan-making for climate change in Surrey Heath*




# 13 Recommendations

13.1.1 The aim of this study has been to review the breadth of realistic Local Plan interventions, taking into account the climate change imperative, but also recognising the remit and broad scope of the Local Plan (e.g. Surrey Heath is constrained by Green Belt and internationally designated biodiversity sites). In light of the review, it is possible to make a range of recommendations, which are set out below; however, it is important to state that the aim here is not to provide 'the last word'. Final decisions on intervention options to support will need to be made by the Council, after having balanced wide-ranging objectives.

13.1.2 Recommendations are as follows:

- Proactively explore spatial strategy options for shaping the Borough in a way that contributes to radical reductions in emissions, in accordance with NPPF paragraphs 148 and 149. Amongst other things, this will mean exploring options that: direct growth to those parts of the Borough where residents would have greatest opportunity to access services, facilities and employment by active and public transport; involve a concentration of growth at one or more strategic growth locations (where economies of scale and a mix of uses can lead to decarbonisation opportunities); and lead to an opportunity to deliver one or more effective heat networks.
- There should be a particular focus on exploring decarbonisation options relating to the regeneration of Camberley town centre, which could be a once in a century opportunity. Equally, the process of developing and testing options should take account of climate change adaptation and resilience objectives, for example in respect of building layout, orientation and design, shading, green infrastructure and sustainable drainage.
- Establish site-specific policy for other key strategic locations to effectively respond to climate change-related issues and opportunities; for example, balancing competing objectives around, on the one hand, wishing to deliver higher densities at accessible locations, and achieve economies of scale in support of low carbon and sustainable infrastructure with, on the other hand, a need to design in space for green and blue infrastructure.
- Understand and communicate ‘win-win’ opportunities; for example, support for high building standards is not only positive from a climate change perspective, but also from a perspective of supporting health and wellbeing, addressing issues of fuel poverty and supporting jobs and economic growth (and any tensions with development viability could reduce rapidly as economies of scale are achieved and a skilled labour force builds).
- Undertake work to better understand the potential to deliver a strategic expansion of walking and cycling infrastructure within the urban area, and potentially borough-wide, working with the County Council.
- Consider whether there are any strategic public transport infrastructure / service upgrades to be realised or facilitated through the Local Plan spatial strategy.
- Give consideration to issues and opportunities associated with the ‘future of mobility’ (particularly within the main urban area), the transition to a whole system smart electricity network and future proofing for hydrogen.
- Work with the County Council to accelerate delivery of a network of EV charging infrastructure, recognising the need for different types of charge point integrated with solar PV and battery storage.
- In addition to broad policy support for LZC power, consider identifying areas of search, or even site allocations, to deliver larger scale solar PV (potentially alongside battery storage and EV charging).
- Set buildings emissions standards as stringently as possible, taking account of Government policy and development viability, and consider a targeted approach, i.e. more stringent where viability allows.
- Set wider sustainable design and construction policy aimed at minimising emissions across the whole-lifecycle of development, and also ensuring resilience to climate change risks, with a focus on detailed requirements suited to effective application at the planning application stage were possible, but balancing this with a need to avoid constraining innovation on the part of developers (suggesting a role for outcome focused policies).
- Take a precautionary (yet proportionate) approach to minimising flood risk, and also a proactive approach that recognises vulnerability and also the potential to support delivery of strategic flood risk attenuation measures;
- Minimise wastewater treatment risks by seeking to direct growth to those locations with existing WwTW capacity, thereby minimising reliance on the need for costly upgrades associated with delivery risk.
- Take a strategic approach to biodiversity and environmental net gain that recognises the climate change-related imperative of maintaining and enhancing wide-ranging ecosystem services, including carbon sequestration.
- Consider appropriate Local Plan monitoring indicators, with associated targets, recognising that Local Plan monitoring can be an appropriate forum for monitoring broad trends, even where they are not directly caused by the Local Plan. Equally, commit to actions should monitoring show that targets are not being achieved.
- Consider an appropriate borough-wide decarbonisation trajectory and net zero target date, and ensure the Local Plan is seen as an integrated element of the wider Council climate change strategy.

# Appendix 1: Climate change risk assessment

The Adaptation Sub-Committee of the Committee on Climate Change Evidence Report[228] identifies and assesses 56 individual climate change risks and opportunities for the UK.

The aim of this Appendix is to review each of the risks/opportunities in turn, present a summary assessment (in terms of likelihood/impact) tailored to Surrey Heath, and then reach a conclusion on the relevance of each of the risks/opportunities to the Surrey Heath Local Plan.

## Methodology

The table below considers each of the 56 climate change risks and opportunities in turn, and seeks to differentiate the risks in respect of:

- likelihood of the risk occurring;
- the extent of the impact, should it occur; and
- relevance to the Surrey Heath Local Plan.

*Table A: Assessment of possible climate change risks and opportunities for Surrey Heath Borough*

| Sector | Risk / opportunity | Likelihood of risk | | Impact from risk | | Relevance to the Surrey Heath Local Plan |
|---|---|---|---|---|---|---|
| | | Score | Explanation and references | Score | Explanation and references | |
| Natural environment and natural assets | Risks to species and habitats from changing climate space | Moderate | Climate projections suggest temperature and precipitation changes which are likely to impact species and habitats.[1,9,10] | Moderate | Borough has a high coverage of important habitats and species, which provide a range of ecosystem services to the local community.[6,9] | Moderate |
| | Opportunities from new species colonisations | Moderate | Climate projections suggest temperature and precipitation changes which are likely to enable new species colonisations.[1,9,10] | Positive | New species colonisations would increase biodiversity and other ecosystem services provided to the local community.[6] | Low |
| | Risks to soils from increased seasonal aridity and wetness | Moderate | More frequent and intense drought and flooding events are likely to impact soil conditions.[1,4,5,7,8,10] | Moderate | Reductions in soil quality and quantity will negatively affect agricultural systems and natural ecosystems.[6,9] | Moderate |

[228] See theccc.org.uk/tackling-climate-change/preparing-for-climate-change/uk-climate-change-risk-assessment-2017/

| Sector | Risk / opportunity | Likelihood of risk | | Impact from risk | | Relevance to the Surrey Heath Local Plan |
|---|---|---|---|---|---|---|
| | | Score | Explanation and references | Score | Explanation and references | |
| | Risks to natural carbon stores & carbon sequestration | Moderate | Climate projections suggest temperature and precipitation changes which are likely to impact habitats that store and sequester carbon.[1,9,10] | Moderate | Borough has a high coverage of woodland habitats and species, which are important for carbon storage, climate regulation and air quality regulation.[9] | Moderate |
| | Risks to agriculture & wildlife from water scarcity & flooding | Moderate | More frequent and intense drought and flooding events are likely to impact agriculture and wildlife.[1,4,5,7,8,9,10] | High | Destruction of agricultural systems and wildlife will have far-reaching social, economic and environmental impacts.[6,9,10] | Low |
| | Risks of land management practices exacerbating flood risk | Moderate | Exiting areas of high to medium flood risk on undeveloped land, could be under further risk if land management changes.[2,5,7,10] | Moderate | Increased flood risk has the potential to damage local assets, including properties and infrastructure.[8] | Moderate |
| | Risks to habitats & heritage in the coastal zone from sea level rise; loss of natural flood protection | Low | Surrey Heath is not located in close proximity to the coast, therefore sea level rise is extremely unlikely to occur within the borough.[1] | Low | None of the borough's habitats or heritage sites are located within coastal zones so no impacts are anticipated. | N/a |
| | Changes in suitability of land for agriculture & forests | Moderate | Climate projections suggest temperature and precipitation changes which are likely to change suitability of land used for agriculture and forestry.[1,6,9,10] | High | Destruction of agricultural and forestry systems will have far-reaching social, economic and environmental impacts.[9] | Low |
| | Risks to freshwater species from high water temperatures | Moderate | Climate projections suggest temperature changes are likely to impact freshwater species.[1,10] | Low | Impacts on freshwater species within the borough's watercourses is likely to have minor impacts on aquatic biodiversity, angling and small-scale aquaculture. | Moderate |

| Sector | Risk / opportunity | Likelihood of risk | | Impact from risk | | Relevance to the Surrey Heath Local Plan |
|---|---|---|---|---|---|---|
| | | Score | Explanation and references | Score | Explanation and references | |
| | Ocean acidification & higher water temperature risks for marine species, fisheries and marine heritage | Low | Surrey Heath is not located in close proximity to the coast, therefore ocean acidification and higher marine temperature are not relevant. | Low | None of the borough's species, fisheries or heritage sites are marine, therefore no direct impacts are anticipated. | N/a |
| | Risks to agriculture, forestry, landscapes & wildlife from pests/pathogens/invasive species | Moderate | Climate projections suggest temperature and precipitation changes which may increase the incidence of pests, pathogens or invasive species.[1,6,10] | Moderate | Establishment of pests, pathogens or invasive species is likely to decrease the productivity of agricultural and forestry systems.[6,10] | Low |
| | Extreme weather/wildfire risks to farming, forestry, wildlife & heritage | Moderate | Climate projections suggest that incidence of wildfires and other extreme weather events its likely to increase within the borough.[1,8] | High | Large areas of woodland/heathland that are at high-risk from wildfires are located in close proximity to development and infrastructure, therefore impacts are likely to be serious, e.g. fatalities, property damage.[8] | Low |
| | Saltwater intrusion risks to aquifers, farmland & habitats | Low | Surrey Heath is not located near the coast therefore saltwater intrusion is extremely unlikely to occur within the borough.[1] | Low | None of the borough's aquifers, farmland or habitats are near saltwater so no impacts are anticipated. | N/a |
| | Risks & opportunities from changes in landscape character | Moderate | Climate projections suggest temperature and precipitation changes are likely to affect the landscape character of the local area.[1,10] | Low | Impacts on the local landscape character is likely to have minor negative or minor positive impacts on the local community. | Moderate |
| Infrastructure | Risks of cascading infrastructure failures across interdependent networks | Moderate | Climate projections suggest that extreme weather events such as flooding and heatwaves are likely to increase in severity and intensity, making inter-dependent infrastructure more vulnerable to failure.[1,6,8,9,10] | Moderate | Failure of infrastructure networks will disrupt community services, such as travel, water, and energy.[6,8,9] | Low |

| Sector | Risk / opportunity | Likelihood of risk | | Impact from risk | | Relevance to the Surrey Heath Local Plan |
|---|---|---|---|---|---|---|
| | | Score | Explanation and references | Score | Explanation and references | |
| | Risks to infrastructure from river, surface/groundwater flooding | Moderate | Climate projections suggest that increased flooding (particularly fluvial and surface) is likely to impact local infrastructure.[1,4,5,6,7,8,9,10] | Moderate | Floodplains in Surrey Heath are relatively undeveloped, however local infrastructure is likely to be impacted from fluvial and surface flooding.[6,8,9,13] | Low |
| | Risks to infrastructure from coastal flooding & erosion | Low | Surrey Heath is not located near the coast therefore coastal flooding and erosion is extremely unlikely to occur within the borough.[1] | Low | None of the borough's infrastructure is located near the coast, so no impacts are anticipated. | N/a |
| | Risks of sewer flooding due to heavy rainfall | Moderate | Increased rainfall projected from climate change and dense drainage networks (particularly in the west of the Borough) will increase the probability of sewer flooding.[1,7,10] | Moderate | Sewer flooding is likely to have negative impacts where it occurs in close proximity to development, infrastructure or natural habitats.[7,10] | High |
| | Risks to transport networks from embankment failure | Low | While increased rainfall projected by climate change can lead to landslides and slope failures, land movement within Surrey Heath is not likely to occur.[1,8] | Moderate | If landslides occur near transport networks, this is likely to result in negative impacts such as costly damages and disruptions.[1,8] | Low |
| | Risks to public water supplies from drought and low river flows | Low | Water supply planning by Surrey Heath Borough Council and Thames Water companies take climate projections into consideration, therefore the likelihood of public water supply interruptions is low.[1,11] | Moderate | Droughts are likely cause reduced quality and quantity of water within public water supplies, impacting public health, businesses, community services and agriculture production.[8,10] | High |
| | Risks to bridges and pipelines from high river flows/erosion | Moderate | Increased rainfall projected from climate change will likely increase river flow levels and erosion rates, damaging close-by bridges and pipelines (1,10). | Moderate | Damage to bridges and pipelines is likely to cause disruptions to travel, water and energy services (10). | Low |

| Sector | Risk / opportunity | Likelihood of risk | | Impact from risk | | Relevance to the Surrey Heath Local Plan |
|---|---|---|---|---|---|---|
| | | Score | Explanation and references | Score | Explanation and references | |
| | Risks to energy, transport & ICT from high winds & lightning | Low | High winds and lightening do not regularly occurrence in Surrey Heath, and climate projections do not anticipate significant increase in storm activity (1,12,13). | Moderate | Damage to energy, transport and ICT infrastructure from high winds and lightening is likely to cause disruptions to community services (10). | Low |
| | Risks to offshore infrastructure from storms and high waves | Low | Surrey Heath is not located near the coast therefore storms and high waves are extremely unlikely to occur within the borough (1). | Low | None of the borough's infrastructure is located near the coast, so no impacts are anticipated. | N/a |
| | Extreme heat risks to rail, road, ICT and energy infrastructure | Moderate | Climate projections suggest temperature changes and increased heatwave incidence which may expose infrastructure to heat stress (1,6,8,9). | Moderate | Overheating of energy, transport and ICT infrastructure is likely to cause disruptions to community services (8,9,10,13). | Moderate |
| | Benefits for infrastructure from reduced extreme cold events | Moderate | Climate projections suggest temperature changes which may reduce the exposure of infrastructure to extreme cold events (1). | Positive | Reduced exposure of infrastructure to cold events would increase the reliability and efficiency of community services, including transport, energy and ICT (10). | Low |
| | Low/high river flow risks to hydroelectric generation | Moderate | Climate projections suggest precipitation changes which could result in changes to river flows required for hydroelectric generation (1,10). | Low | There are no significant hydroelectric generation schemes on the water courses within the Borough, so no impacts are anticipated. | N/A |
| | Subsidence risks to buried/surface infrastructure | Low | While periods of prolonged heat and drought projected by climate change can lead to increased subsidence risks, land movements within Surrey Heath is not likely to occur (1,8). | Moderate | If subsidence incidences occur near transport, energy, water or ICT networks, this is likely to result in negative impacts such as costly damages and disruptions (1,8). | Low |

| Sector | Risk / opportunity | Likelihood of risk | | Impact from risk | | Relevance to the Surrey Heath Local Plan |
|---|---|---|---|---|---|---|
| | | Score | Explanation and references | Score | Explanation and references | |
| | Risks to electricity generation from drought and low flows | Moderate | Climate projections suggest precipitation changes and increased drought incidence which may affect electricity generation.[1,10] | Moderate | If droughts impact electricity generation, power supply in likely to be disrupted for households, businesses, and industries in the borough.[10] | N/a |
| People and the built environment | Risks to public health and wellbeing from high temperatures | High | Climate projections suggest temperature changes and increased heatwave incidence which are highly likely to impact public health and wellbeing.[1,3,6,8,9,10] | High | High temperatures can cause heat-related illnesses and mortalities, particularly for vulnerable members of the community.[6,8,9,10,13] | High |
| | Potential benefits to health & wellbeing from reduced cold | Moderate | Climate projections suggest temperature changes which are likely to reduce the impact of cold weather on public health and wellbeing.[1,10] | Positive | Reduced occurrence of cold weather events is likely to improve public health and well-being and reduce stress on public health services during the winter.[10] | N/A |
| | Risks to people, communities & buildings from flooding | Moderate | Climate projections suggest that increased flooding (particularly fluvial, surface and sewer) is likely to impact some areas of the local community.[1,2,4,5,6,7,8,9,10] | High | Flooding events can result in a range of severe social, environmental and economic impacts for a local community, including property damage, and delays and disruption to transport and utility services.[2,4,6,8,9,10,13] | High |
| | Risks to health and social care delivery from extreme weather | Moderate | Projected increases in extreme weather, particularly flooding, heatwaves and droughts are likely to impact delivery of health and social care.[1,6,8,9,10] | Moderate | Disruptions to health and service delivery is likely to have health and well-being impacts on vulnerable members of the community.[8,10] | Moderate |
| | Risks to passengers from high temperatures on public transport | Moderate | Climate projections suggest temperature changes and increased heatwave incidence which are likely to impact transport conditions.[1,6,8,10] | Moderate | High temperatures on public transport are likely to result in health and well-being impacts for users.[8,10] | Moderate |

| Sector | Risk / opportunity | Likelihood of risk | | Impact from risk | | Relevance to the Surrey Heath Local Plan |
|---|---|---|---|---|---|---|
| | | Score | Explanation and references | Score | Explanation and references | |
| | Risks to viability of coastal communities from sea level rise | Low | Surrey Heath is not located near the coast therefore sea level rise is extremely unlikely to affect the borough.[1] | Low | None of the borough's communities are located near the coast, so no impacts are anticipated. | N/a |
| | Risks to building fabric from moisture, wind, and driving rain | Moderate | Climate projections do not anticipate significant increase in storm activity, however more frequent intense rainfall events may lead to greater moisture inside buildings.[1,10] | Low | Increased moisture inside buildings is anticipated to have minor impacts, such as damage to furniture and carpets.[10] | Moderate |
| | Risks to culturally valued structures and historic environment | Moderate | Climate projections suggest, temperature, precipitation and extreme weather changes that are likely to impact cultural or historical environments.[1,10] | Moderate | Heave waves, floods and droughts are likely to causes irreversible damage to culturally or historically important structures or environments.[10] | Moderate |
| | Risks to health from changes in air quality | Moderate | Projected increases in the intensity and severity of heatwaves, will impact air quality conditions, particular in urban areas.[1,10] | Moderate | Poor air quality levels can have a range of health and well-being impacts on residents, employees and visitors (e.g. respiratory infections), however this is only likely to occur in built up areas of the Borough.[6,8,10] | Moderate |
| | Risks to health from vector-borne pathogens | Moderate | Global variations in temperature and precipitation may lead to greater risks from vector borne diseases if the right conditions for spread are present.[1,8,10] | Moderate | Increased occurrence of vector-borne pathogens is likely to have public health and well-being implications and increase stress on public health services.[8,10] | Low |
| | Risks to health from poor water quality | Low | Water supply planning by Surrey Heath Borough Council and Thames Water companies take climate projections into consideration, therefore the likelihood of poor water quality is low.[1,11] | Moderate | Decreases in water quality is likely to have public health and well-being implications and increase stress on public health services.[10] | N/a |

| Sector | Risk / opportunity | Likelihood of risk | | Impact from risk | | Relevance to the Surrey Heath Local Plan |
|---|---|---|---|---|---|---|
| | | Score | Explanation and references | Score | Explanation and references | |
| | Risk of household water supply interruptions | Low | Water supply planning by Surrey Heath Borough Council and Thames Water companies take climate projections into consideration, therefore the likelihood of water supply interruptions is low.[1,11] | Moderate | Decreases in water quantity is likely to have public health and well-being implications and increase stress on public health services.[10] | Moderate |
| | Opportunities for increased outdoor activity in warmer weather | Moderate | Projected increases in summer and winter temperatures are likely to lead to greater participation in outdoor activities.[1,6,10] | Positive | Increased uptake of outdoor activities will have positive impacts on physical and mental health, and may increase tourism within the Borough.[6,10] | High |
| | Risks of food-borne disease cases and outbreaks | Moderate | Global variations in temperature and precipitation may lead to greater risks from food borne diseases if the right conditions are present.[1,8,10] | Moderate | Increased occurrence of food borne pathogens is likely to have public health and well-being implications and increase stress on public health services.[8,10] | N/a |
| Business and industry | Risks to business sites from fl-ooding | Moderate | Climate projections suggest that increased flooding (particularly fluvial, surface and sewer) is likely to impact business located in flood-risk areas.[1,2,4,5,6,7,8,9,10] | Moderate | Flooding events can result in a range of social and economic impacts for businesses, including property damage and loss of work.[2,4,6,8,9,10,13] | High |
| | Risks to business from loss of coastal locations & infrastructure | Low | Surrey Heath is not located near the coast therefore sea level rise is extremely unlikely to affect businesses in the borough.[1] | Low | None of the borough's businesses are located near the coast, so no impacts are anticipated. | N/a |
| | Employee productivity impacts in heatwaves and from severe weather infrastructure disruption | Moderate | Projected temperature and precipitation changes will result in more frequent and intense flooding, heatwaves and droughts, which are all likely to effect employee productivity.[1,8,9,10] | Moderate | Health and well-being impacts and/or travel disruptions from heatwaves and flooding can decrease workforce productivity and result in increased staff absences.[8,9,10] | Low |

| Sector | Risk / opportunity | Likelihood of risk | | Impact from risk | | Relevance to the Surrey Heath Local Plan |
|---|---|---|---|---|---|---|
| | | Score | Explanation and references | Score | Explanation and references | |
| | Risks to business operations from water scarcity | Low | Water supply planning by Surrey Heath Borough Council and Thames Water companies take climate projections into consideration, therefore the likelihood of water supply interruptions is low.[1,11] | Moderate | If drought results in insufficient water supply, this is likely to disrupt or delay business operations.[10] | Low |
| | Risks to business from disruption to supply chains | Moderate | Global and national variations in temperature, precipitation and extreme weather may disrupt supply chains.[1,8,10] | Moderate | Supply chain delays and disruptions are likely to delay or disrupt operations for local businesses.[8,10] | N/a |
| | Risks to business from reduced access to capital | Low | Increases in global and national extreme weather events, may reduce businesses access to capital, however this is unlikely.[1,10] | Moderate | Some businesses will experience financial implications if climatic events reduce access to this capital.[10] | N/a |
| | Business risks/opportunities from changing demand for goods & services | Moderate | Global and national variations in climate are likely to shift demand for particular goods and services, for example increase need for air conditioning units.[1,10] | Low | Changing customer demand is likely to have minor negative or positive impacts on business within the Borough.[10] | N/a |
| International dimensions | Weather-related shocks to global food production and trade | Moderate | Global and national variations in temperature, precipitation and extreme weather may affect food production and trade.[1,10] | Moderate | In some cases, residents may be unable to access favoured or necessary food items and businesses may be disrupted by trade issues.[10] | Low |
| | Risks from climate-related international human displacement | Moderate | Global and national variations in temperature, precipitation and extreme weather is likely to lead to increased international human displacement.[1,10] | Moderate | International or national climate refugees and migrants may move into the borough, potentially putting strain on community resources, such as healthcare and schools.[10] | N/a |

| Sector | Risk / opportunity | Likelihood of risk | | Impact from risk | | Relevance to the Surrey Heath Local Plan |
|---|---|---|---|---|---|---|
| | | Score | Explanation and references | Score | Explanation and references | |
| | Imported food safety risks | Moderate | Global and national climate variations may decrease food safety.[1,10] | Moderate | Reduced food safety is likely to have health and well-being implications for local residents.[10] | N/a |
| | Long-term changes in global food production | Moderate | Global and national variations in temperature, precipitation and extreme weather may affect food production.[1,10] | Moderate | In some cases, residents and food-related businesses may be unable to access favoured or necessary food items.[10] | N/a |
| | Risks to the UK from international violent conflict | Moderate | Global and national climate variations may result in increased international violent conflict.[1,10] | Moderate | Increased violent conflict, could result is global instabilities and increased numbers of refugees, which could have indirect impacts on the Borough.[10] | N/a |
| | Risks to international law and governance | Moderate | Global and national climate variations may result in changes to international law and governance.[1,10] | Moderate | Changes to international law and governance could result in global instabilities, which could have indirect impacts on the Borough.[10] | N/a |
| | Opportunities from changes in international trade routes | Moderate | Global and national climate variations may result in changes to international trade routes.[1,10] | Positive | Changes to international trade routes are unlikely to impact the Borough, however there may be some minor positive impacts to local businesses.[10] | N/a |

*References: (1) - UK Climate Projections 2018 (UKCP18); (2) - Neighbourhood Flood Vulnerability Index (NFVI); (3) - Social Heat Vulnerability Index (SHVI); (4) - Social Flood Risk Index (SFRI); (5) - Environment Agency Flood Maps for Planning; (6) - Surrey Climate Change Strategy; (7) - Surrey Heath Borough Council Strategic Flood Risk Assessment; (8) - Surrey's Local Resilience Forum (SLRF) Strategic Climate Change Guidance: Impacts, Mitigation and Adaptation for Surrey; (9) - A Summary of Climate Change Risks for South East England; (10) - UK Climate Change risk Assessment 2017; (11) - Hart, Rushmoor and Surrey Heath Water Cycle Study; (12) – State of the UK Climate 2018; (13) Met office summaries of previous weather events*