INFORMAL PLANNING POLICY GUIDANCE

# The Reduction of Carbon in New Development

June 2022

Nottingham City Council

# Contents

# Foreword

I am delighted to endorse this Informal Planning Policy Guidance, which recognises the contribution that reducing carbon in new development can make to tackling Climate Change. It represents a significant step in bringing forward our ambitions to become carbon-neutral by 2028 as set out in our Carbon Neutral Charter and Action Plan. It will help to cut carbon dioxide ($CO_2$) emissions from direct and indirect sources that arise from the consumption of energy and look to offset those emissions that can't be eliminated.

It is part of our planning policy approach to radically reduce carbon emissions and is particularly timely in the context of the Intergovernmental Panel on Climate Change declaration of a 'code red for humanity'. Their report warns that human activity is changing the climate in unprecedented and sometimes irreversible ways. It predicts increasing extreme heatwaves, droughts and flooding and a rise in global temperatures of 1.5 degrees Celsius occurring in just over a decade without massive reductions in carbon emissions.

This Informal Planning Guidance promotes a range of measures that developers can employ to reduce carbon in their development proposals. These relate to energy efficiency, renewable energy and sustainable design and construction. It is hoped that by requiring a Carbon Reduction/Energy Statement for all major planning applications significant reductions in carbon will be achieved.

This Guidance formalises the City Council's approach, which is already being promoted across the Council including within the Development Management team. It will have an immediate impact on carbon emissions as developers are now required to demonstrate how their buildings use energy, and it strongly promotes low carbon methods.

Moving forward, the Council will be progressing a Supplementary Planning Document to support its approach to carbon neutrality and formulating new policies to tackle this issue in its emerging Strategic Plan, which will secure increasingly sustainable and carbon neutral development. I look forward to continuing to work with the development sector in tackling this climate emergency.

**Councillor Pavlos Kotsonis**

**Portfolio Holder for Leisure, Culture and Planning at Nottingham City Council**

# 1.0 Purpose and status of the document

1.1 This Informal Planning Policy Guidance seeks to support the City Council's agreed Action Plan to achieve Carbon Neutrality by 2028. It provides further guidance on the policies of the Aligned Core Strategy and Land and Planning Policies Document (LAPP) and will be a material consideration in the determination of planning applications.

1.2 Primarily, it explains the implications of Policies CC1 to CC3 in the LAPP, however, it is important to note that other LAPP policies are also relevant when considering carbon such as those relating to transport, landscaping and biodiversity. It seeks to explain and encourage the incorporation of carbon reducing techniques in new development, building on existing Local Plan policies.

# 2.0 Introduction

2.1 In accordance with the Council's agreed Action Plan to achieve Carbon Neutrality by 2028, this guidance advises on the range of measures possible to reduce carbon in new residential and commercial development proposals. It explains existing planning policies as contained in the Nottingham City Aligned Core Strategy (2014) and the Local Plan Part 2 (LAPP, 2020).

2.2 Taking into consideration the policy context and best practice examples, this guidance provides information in relation to energy efficiency, renewable energy and sustainable design and construction and contains details of a Carbon Reduction/Energy Statement which applicants for all major residential and commercial development are required to submit in order to demonstrate compliance with the policy approach. It focuses on measures that can be secured through the development management process.

2.3 31% of Green House Gas (including carbon) emissions come from industrial, commercial and residential buildings and a range of ways in which a developer can reduce carbon are explored in this guidance. The choice of means of reducing carbon will be a matter for each developer, and the Council is not intending to prescribe any particular approach beyond what is already required by the adopted Local Plan.

# 3.0 New Requirement for a Carbon Reduction/Energy Statement

3.1 This document represents the first step towards comprehensive guidance intended to assist in the delivery of the Council's target of achieving a resilient and sustainable carbon-neutral Nottingham by 2028.

3.2 In accordance with LAPP Policy CC1, all new 'major' applications, i.e. those for development of 10 or more homes and Change of Use and commercial development of 1000 m2 and above will be required to be supported by a Carbon Reduction/Energy Statement, demonstrating how the proposed development contributes towards the City Council's carbon neutral objective.

3.3 The matters to be covered in the Carbon Reduction/Energy Statement are set out in Appendix 1 When considering new development, sustainable building techniques should also be considered at an early stage as they contribute to reducing energy consumption and these are detailed in Appendix 2.

3.4 In order to have an immediate impact on carbon emissions the Council will expect the Carbon Reduction/Energy Statement to demonstrate that the energy use of the building (regulated emissions, which include the energy consumed in the operation of the space heating/cooling and hot-water systems, ventilation, internal lighting) will be provided through low carbon methods. Whilst we strongly encourage this statement to address issues of embodied carbon in materials, the Council recognises planning policy can have a limited influence over construction materials and methods.

3.5 The Council is committed to building on this guidance and will be developing a Supplementary Planning Document (SPD) to support its ambitions to be carbon neutral by 2028. The SPD will be programmed to tie in with the Government's implementation of the Future Buildings Standard (FBS) and Future Homes Standard (FHS), and will highlight the role of planning policy in securing carbon savings. The Council will also look to further enhance the policy basis for carbon emission reduction by including a carbon neutral/carbon reduction policy in the forthcoming Greater Nottingham Strategic Plan.

# 4.0 Consultation

4.1 A first draft of this Guidance was formally consulted on for 6 weeks from Monday 18 October to Monday 29 November 2021. The representations received have been used to shape this final document where appropriate. Please review the representations and the Council's responses to them in the separate Report of Consultation.

# 5.0 Background

## Climate Change

5.1 The Climate Change Act 2008 (CCA) sets targets for the reduction of certain greenhouse gasses. The Government has set a legally binding target to achieve net zero greenhouse gas emissions across the UK economy by 2050. Whilst the UK Government has set a target for the UK to be carbon neutral by 2050, Nottingham City Council has introduced a more ambitious target and pledged to become a carbon neutral city by 2028.

## The Future Homes Standard and Future Building Standard

5.2 The government consulted on Future Homes Standards in 2019 with the aim of bringing these new standards into force in 2025. The proposals amount to a significant reduction in carbon based on producing 75-80% less CO2 emissions than homes built to current requirements. The intention is to future proof new homes for low carbon heating systems and meet higher standards of energy efficiency.

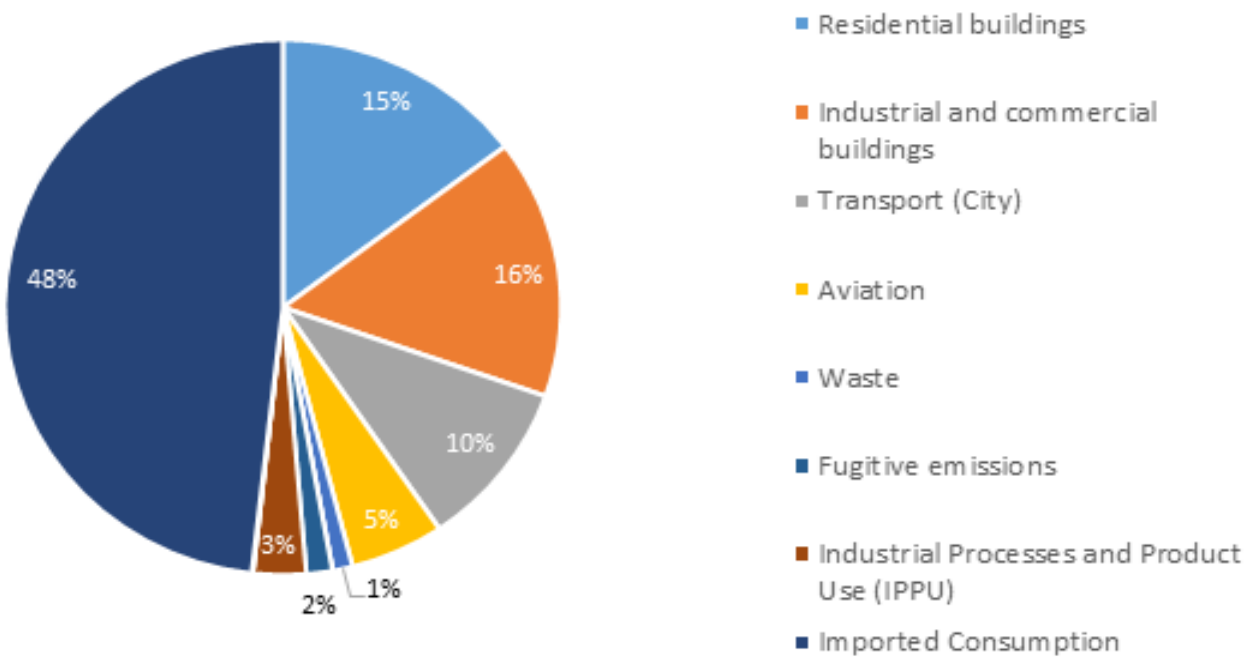
5.3 The Government then published its response to the Consultation on Future Homes Standards 2019 with changes to Part L (energy) and Part F (ventilation) of the Building Regulations. It confirmed that it would not amend the Planning and Energy Act 2008, which means that local authorities retain powers to set local energy efficiency standards for new homes in their local plans.

5.4 The Government's consultation response to proposed changes to Parts L (energy) and F (ventilation) of the Building Regulations sets out how, within four years (up to 2025), new housing must produce 75-80% less carbon emissions than allowed under the current regulations. As a first step, from June 2022 all new homes will be expected to produce 31 per cent lower carbon emissions as part of an 'interim uplift' in Part L standards. In addition, from 2025 new homes cannot be built with fossil fuel heating, such as a natural gas boiler. All new housing will also have to be future-proofed so that 'no further energy efficiency retrofit work will be necessary to enable them to become zero-carbon as the electricity grid continues to decarbonise'. There are also proposals for an overheating mitigation requirement to be introduced into the Building Regulations.

5.5 The Government also intends to set higher performance targets for non-domestic buildings (Future Building Standard), which will have to be 'zero carbon ready' by 2025. This involves uplifting minimum energy efficiency standards, uplifting minimum standards for new and replacement thermal elements (i.e. walls, floors, roofs) and controlled fittings (e.g. windows, roof-lights and doors).

5.6 The existing Building Regulations and future revisions are a crucial element in achieving zero carbon development. The planning guidance set out in this document is intended to complement the relevant existing and future building regulations.

Figure 1: **Nottingham's Greenhouse Gas Emissions by Source (2018)**




5.7 Figure 1 above shows the percentages of Green House Gas emissions in Nottingham from each identified source. Nottingham City Council has made the commitment to become a carbon neutral city by 2028. This means cutting carbon dioxide (CO2) emissions from direct and indirect sources that arise from the consumption of energy within the city to near zero and offsetting those emissions that cannot be eliminated.

5.8 The action plan builds on the Nottingham 2028 Carbon Neutral Charter by setting out high-level objectives in order to achieve a resilient and carbon neutral Nottingham by 2028. These are broken down into four main sections: Carbon Reduction Measures, Carbon Removal and Offsetting, Resilience and Adaptation, Ecology and Biodiversity.

### Section 1 – Carbon Reduction Measures

5.9 The action plan prioritises carbon reduction measures to allow the City to stay within its carbon budget and meet the 2028 carbon neutral ambition. To do this, emission reduction rates would have to be in excess of 22.3% per year. This section is further broken down into five chapters for activity: Transport, The Built Environment, Energy Generation, and Waste & Water Consumption. Within each chapter, the plan identifies key objectives for achieving carbon neutrality and the steps to take towards it.

### Section 2 – Carbon Removal and Offsetting

5.10 The second section of the action plan focusses on carbon capture and offsetting of residual greenhouse gas emissions that cannot be removed entirely. Negative emissions technologies and offsetting could be used to neutralise remaining emissions. These are broken down into three groups:

1. Local carbon offsetting – using nature or geology around the city to take carbon from the atmosphere and store it. This could be stored in plants, trees and soil, or in underground spaces between rocks.

2. Carbon capture – the use of negative emissions technologies to capture carbon from the atmosphere and at point of source.
3. Large scale carbon offsetting – activities outside the City that can offset the emissions we generate locally through other mechanisms.

**Section 3 – Resilience and Adaption**

5.11 The third section of the action plan addresses the actions Nottingham must take to protect against the harmful impacts of climate change that are unavoidable. While the global goal of ensuring temperature rises are below 1.5$^{o}$C to avoid the most severe consequences of climate change, Nottingham is already beginning to experience localised impacts such as flooding and extreme temperatures.

**Section 4 – Ecology & Biodiversity**

5.12 The fourth and final section details the importance of green and open spaces, and biodiversity, for climate change mitigation and adaptation - unlocking other positive outcomes such as improvements in our physical and mental wellbeing and enhancing the local landscape.

5.13 Incorporating the Biodiversity SPD is central to this aim as it supports the following:

- Use of biodiversity enhancements in all developments, ensuring net gain in Biodiversity
- The consideration of green roofs, green walls, and sustainable urban drainage systems, in new developments
- Identifying aspirational projects for small scale wetland creation, biodiversity enhancement opportunities and natural flood defences
- Encouraging sustainable and nature friendly development beyond the levels mandated by legislation

5.14 Some key aspirations/actions of the action plan that are covered by this guidance are listed below:

- Moving away from the use of gas for space heating towards lower carbon alternatives such as electric heat pumps and heat networks
- Monitoring and encouraging energy efficiency standards and improvements
- Increasing adoption of energy efficiency technologies
- Minimising emissions in construction of new buildings and through procurement of technologies and materials
- Promoting more sustainable materials for new construction based on the BREEAM tool (see glossary)
- Investigating the potential for expanding the District Heat Network and developing smaller neighbourhood district heating schemes

5.15 The Council has also put other strategies and policies in place to promote carbon neutrality such as: Local Transport Plans that promote sustainable transport; on site renewable energy technology to help power Council buildings; retrofitting local authority housing stock with improved insulation and renewable energy technologies such as solar panels. In 2019 the Council endorsed the ‘Air Quality Strategy for Nottingham and Nottinghamshire 2020-2030’.

# 6.0 Planning Policy Context

## National Legislation, Planning Policy and Practice

6.1 Section 19 of the Planning and Compulsory Purchase Act 2004 requires LPAs to include Local Plan policies to ensure that development and use of land contributes to the mitigation of, and adaptation to, climate change. The Planning and Energy Act 2008 allows LPAs to set energy efficient standards in their development plans policies that exceed the energy efficiency requirements of the building regulations. Such policies must not be inconsistent with relevant national policies for England.

6.2 The National Planning Policy Framework (2021) (NPPF) sets out national requirements for planning and climate change. LPAs are required to adopt proactive strategies to adapt to and mitigate against the impacts of climate change.

6.3 Para 8 includes the following **environmental objective** – 'to protect and enhance our natural, built and historic environment; including making effective use of land, improving biodiversity, using natural resources prudently, minimising waste and pollution, and mitigating and adapting to climate change, including moving to a low carbon economy.'

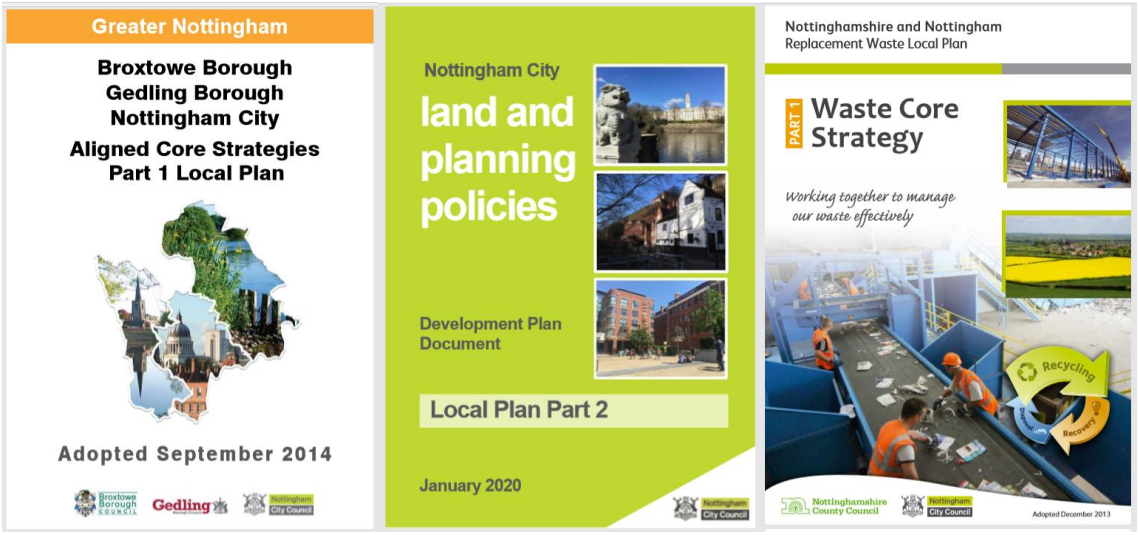
6.4 Para 152 states that 'The planning system should support the transition to a low carbon future in a changing climate, taking full account of flood risk and coastal change. It should help to shape places in ways that contribute to radical reductions in greenhouse gas emissions; minimise vulnerability and improve resilience; encourage the reuse of existing resources, including the conversion of existing buildings; and support renewable and low carbon energy and associated infrastructure.'

6.5 Government Planning Practice Guidance advises how suitable mitigation and adaptation measures can be implemented in the planning process to address the impacts of climate change. The guidance states that development plan policies can set energy performance standards for housing that are higher than building regulations up to the equivalent of the Code for Sustainable Homes Level 4 (See Glossary). Although the UK Government has withdrawn this guidance and replaced it with new technical standards, the Code for Sustainable Homes remains a well-established reference point for local planning authorities and developers.

## Local Policy Response to Climate Change

6.6 Nottingham's Local Plan comprises three parts; the Aligned Core Strategies: Part 1 Local Plan (2014), the Land and Planning Polices Document (LAPP): Part 2 Local Plan (2020) and the Waste Core Strategy (2013) – see Figure 2.

Figure 2: Nottingham City Council adopted Local Plan documents




6.7 The Local Plan policies lead with sustainability in line with the NPPF and its presumption in favour of sustainable development. Policy 1 of the Core Strategy seeks to reduce carbon dioxide emissions by implementing an energy hierarchy, which applies a fabric first approach, followed by a requirement to use energy efficient supplies (such as connection to heat or power networks, and finally the need to maximise the use of renewable and low carbon energy generating systems. It does not prescribe requirements relating to energy performance in new dwellings but seeks to secure sustainable design features to maximise resilience and adaptation to climate change. However, for new non-domestic buildings Policy CC1 of the LAPP requires sustainable construction standards which also include energy performance standards.

6.8 The LAPP relies on three main development management policies relating to Climate Change: Policy CC1: Sustainable Design and Construction, CC2: Decentralised Energy and Heat Networks and CC3: Water. Other LAPP policies are also of relevance as set out in Appendix 1.

6.9 All the Local Plan policies offer general advice and guidelines in relation to sustainable development. Policy 1 specifically encourages developers to produce energy statements in support of development as an effective way of demonstrating how development contributes to both mitigating the causes of climate change and adapting to its effects.

# 7.0 Energy efficiency and adaptation

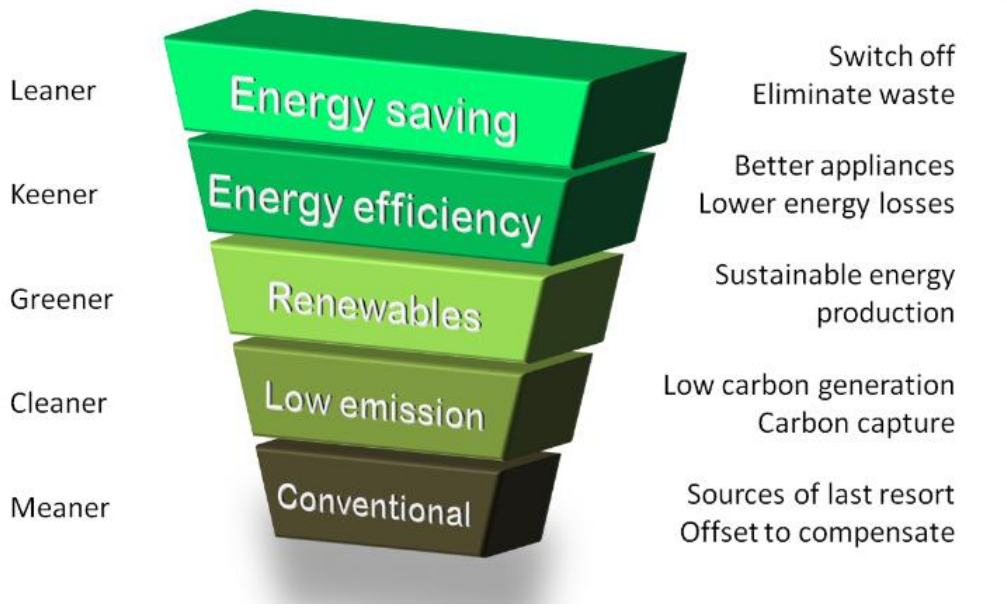
## Achieving an energy carbon neutral building

7.1 The ability to achieve net zero energy in buildings depends on location, orientation and surrounding buildings. Most net zero energy buildings get half or more of their energy from the grid, and return the same amount at other times. Buildings that produce a surplus of energy over the year may be called "energy-plus buildings" and buildings that consume slightly more energy than they produce are called "near-zero energy buildings" or "ultra-low energy houses".

7.2 Traditional buildings consume approximately 40% of the total fossil fuel energy in the UK and are significant contributors of greenhouse gases. The net zero energy consumption principle is viewed as a means to reduce carbon emissions and reduce dependence on fossil fuels.

7.3 Whilst there have been advances in the production of renewable electricity on the grid, it remains a less sustainable option due to the amount of energy lost in transportation from source to end user. Many zero-energy buildings use the electrical grid for energy storage but some are independent of the grid. Energy can be harvested on-site through energy producing technologies like solar and wind, while reducing the overall use of energy with highly efficient lighting technologies. The zero-energy goal is becoming more practical as the costs of alternative energy technologies decrease and the costs of traditional fossil fuels increase. The development of modern zero-energy buildings is becoming possible largely through the progress made in new energy and construction technologies and techniques, for example high-efficiency ground and air source heat pumps.

Figure 3: The energy hierarchy – source Wikipedia




7.4 The ‘energy hierarchy’ is a recognised approach to reducing the CO2 emissions from new development (see Figure 3). Firstly, long term reductions are normally most effectively made through ensuring the building itself is as energy efficient as possible, and by ensuring that the building’s systems use energy as efficiently as possible, thus reducing its energy demands over its lifetime. Secondly, once the building’s energy demands have been minimised, the focus should be on supplying energy efficiently (encouraging the use of local networks such as combined heat and power). Thirdly, sourcing the building’s remaining energy requirements

from renewable carbon sources can contribute to further CO2 savings, whilst also contributing to national and local targets for renewable and low-carbon generation.

7.5 Supporting renewable and low-carbon decentralised energy schemes is an important component of meeting carbon reduction targets, and in the short term at least, they are capable of delivering greater carbon savings quickly, given the current local planning policy framework.

**The Fabric First approach**

7.6 A 'fabric first' approach to building design involves maximising the performance of the components and materials that make up the building fabric itself, before considering the use of mechanical or electrical building services systems. This can help reduce capital and operational costs, improve energy efficiency and reduce carbon emissions. A fabric first method can also reduce the need for maintenance during the building's life.

7.7 Buildings designed and constructed using the fabric first approach aim to minimise the need for energy consumption through methods such as:

- Maximising air-tightness
- Using Super-high insulation
- Optimising solar gain through the provision of openings and shading
- Optimising natural ventilation
- Using the thermal mass of the building fabric
- Using energy from occupants, electronic devices, cookers and so on

7.8 Focusing on the building fabric first, is generally considered to be more sustainable than relying on energy saving technology, or renewable energy generation, which can be expensive, can have a high embodied energy and may or may not be used efficiently by the consumer.

7.9 Having energy efficiency integrated into the building envelope can mean occupants are required to do less to operate their building and not have to adjust their habits or learn about new technologies. This can result in less reliance on the end user regarding the buildings energy efficiency. Fabric first building systems can be constructed off site, resulting in higher quality and so better performance, reduced labour costs and an increased speed of build.

**Passive Design and The Passive House Form Factor**

7.10 Passive Design maximises the use of 'natural' sources of heating, cooling and ventilation to create comfortable conditions inside buildings. It harnesses environmental conditions such as solar radiation cool night air and air pressure differences to drive the internal environment.

7.11 The Passive House Form Factor quantifies the relationship between the living area of the building and the total amount of surface area that heat can escape from. The Form Factor of a building is key in low energy design because it tells you how thick your insulation has to be. If you can halve the form factor (i.e, simplify the building's shape) you can halve the wall insulation you need to get the same thermal performance. The lower number the better. The calculation is the total heat loss area divided by the floor area. The average semi-detached house has a form factor of 3.

# 8.0 Water Consumption and Flood Risk

8.1 Whilst the UK Water Industry continue to make significant progress in the decarbonisation of the UK water grid, there remains a carbon footprint to wastewater and mains potable water through its abstraction, treatment and distribution. A net zero goal for a building can also be supported by the inclusion of rainwater harvesting, such as water butts in gardens, greywater reuse systems reducing dependency on potable water where that standard of treatment is disproportionate to its use. Buildings can further reduce their consumption by means of simple interventions such as efficient flow taps, showers, dual flush cistern units and aerated appliances. These combined efforts would reduce the water carbon footprint of a development whilst also improving a buildings resilience against the emerging water scarcity issue faced by the region.

8.2 The City Council currently imposes a planning condition requiring new dwellings to meet a water requirement of 110 litres per person per day in order to ensure the efficient use of water resources and comply with Policy CC1 of the Nottingham Local Plan. Severn Trent Water Authority recommend the following be included in new development; single flush siphon toilet cistern and those with a flush volume of 4 litres, showers designed to operate efficiently and with a maximum flow rate of 8 litres per minute, hand wash basin taps with low flow rates of 4 litres per minute or less and water butts for external use in properties with gardens.

8.3 Flood risk is a significant issue in Nottingham City, which is likely to be exacerbated by unpredictable weather associated with climate change. Development proposals that avoid areas of current and future flood risk and which do not increase flooding elsewhere, adopting the precautionary principle to development proposals will therefore be supported. Relevant Local Plan policies are set out in Appendix 1.

8.4 The Climate Just Map Tool is a useful resource in respect of future flood risk mapping as it shows the geography of vulnerability to climate change at a neighbourhood scale. Its purpose is to support local planning and responses to a changing climate. It can be used to assess the vulnerability of particular areas of the city to flood risk. Mapping data is available from the following website: https://www.climatejust.org.uk/map

8.5 Sustainable Urban Drainage Systems (SuDs) seek to capture, delay or manage surface water flooding to copy natural drainage by adopting techniques that deal with surface water through collection, storage and filtering before it is released back into the environment. Further information on SuDs is contained in Appendix 2.

# Appendix 1: Carbon Reduction/Energy Statement

The City Council will require all new applications for development of 10 or more homes, Change of Use and commercial development of 1000 m2 and above to be supported by a Carbon Reduction/Energy Statement. Such a statement, whilst focusing on energy efficiency, requires the developer to consider all aspects of development that can contribute to securing high standards of sustainable development and therefore carbon reduction from the outset. It should include but not be limited to:

- Energy efficiency/use and carbon emissions of the building
- Water conservation
- Flood risk and drainage strategy
- Transport
- Health and Wellbeing including day-lighting analysis and thermal comfort
- Material usage, wastage, responsible sourcing and environmental impact, including embodied carbon
- Pollution issues, low NOx, low global warming potential (GWP), reducing need for mechanical cooling
- Ecological aspects to enhance the proposed developments for flora and fauna; and
- Best practice management of the site

It should be noted that major development proposals are subject to consultation with statutory bodies and others and proposals relating to reducing carbon may need to be further refined/revisited in light of comments received. In addition, not all the questions on the checklist will necessarily apply to Change of Use applications, therefore an applicant should explain which they consider do/should not apply.

Key Core Strategy Policies which should be considered are listed below

- Policy 1: Climate Change
- Policy 10: Design and Enhancing Local Identity
- Policy 16: Green Infrastructure, Parks and Open Space
- Policy 17: Biodiversity

There are also a number of relevant SPDs and informal design guidance

- Open Space SPD
- Biodiversity SPD
- Design Quality Framework

In relation to buildings, the following Local Plan Part 2 (LAPP) Policies are key:

- CC1: Sustainable Design and Construction
- CC2: Decentralised Energy and Heat Networks
- CC3: Water
- DE1: Building Design and Use
- DE2: Context and Place Making

The tables below indicate which issues will be required to be addressed in the Carbon Reduction checklist/Energy Statement for all major applications at outline and detailed planning stage.

| **Sustainable Design, construction and climate change mitigation and adaptation** |
|---|
| • **Fabric first**<br>What % of thermal efficiency is to be achieved above current Building Regulations at the time the planning application is submitted? Please provide details of the Target Emission Rate (TER). |
| • **Embodied carbon**<br>Is development the re-use of an existing building or demolition/new build?<br>What innovative lower carbon building technologies have been employed? For example, timber construction using sustainable UK sourced timber, carbon mineralisation in concrete, carbon capture paints, low carbon/negative carbon insulation and olivines in parking/pedestrian surfaces. |
| • **Energy**<br>How is the development to be powered, including **Regulated emissions** (Energy consumed in the operation of the space heating/cooling and hot-water systems, ventilation, internal lighting etc.)?<br><br>How does the use of innovative materials and efficient design contribute to using less energy? Please provide details of the estimated reduction in the development's baseline carbon and/or energy emissions.<br>What percentage of energy will be taken from the grid?<br>Have local energy resources been exploited? E.g. city centre heat network, communal low carbon heat network based on air of water source heat pumps.<br>How has on-site electricity generation and storage capacity been maximised?<br>What renewable/low carbon energy generation techniques are proposed?<br>Are these supported by liquid metal batteries?<br><br>Does the development propose use of local networks energy sources (e.g. district/local heating/power system; building/community battery; ground source heat pump/caves/mines; solar/PVs; biomass)?<br>Does the proposal use passive as opposed to mechanical ventilation? |
| • **Solar gain**<br>What measures are proposed to address solar gain? |
| • **Water (usage)**<br>What measures are included to reduce water consumption? (in accordance with LAPP Policy 110 litres per day). |
| • **Water (waste)**<br>What Sustainable Urban Drainage Solutions have been included? (e.g. swales/balancing ponds; grey water re-cycling; hydro brakes).<br>What is the level of surface water run-off relative to greenfield rates?<br>(Ref: DQF guidance) |
| • **Roofs**<br>Do the roofs accommodate Photo Voltaic Panels; green roof; brown roof; roof top garden/trees/landscaping? |
| • **Carbon Offsetting**<br>What carbon offsetting has been considered/used? |

In relation to the Natural Environment, the following LAPP Policies are key:

- EN2: Open Space in New Development
- EN6: Biodiversity
- EN7: Trees
- DE2: Context and Placemaking

| **Natural Environment** |
|---|
| • **Trees**<br>How many trees are to be felled?<br>How many heavy standard trees are proposed to be planted? |
| • **Landscaping**<br>How will landscaping be improved? |
| • **Details of Biodiversity Gain**<br>○ Bee friendly city - what measures are incorporated to address this?<br>○ Bird/bat boxes – are any to be provided?<br>○ In accordance with the mitigation hierarchy what other species and habitats measures are proposed (eg. hedgehog fencing)? |

In relation to Transport, the following LAPP Policies are key:

- CC1: Sustainable Design and Construction
- TR1: Parking and Travel Planning
- TR3: Cycling

| **Transport** |
|---|
| • **Electric Vehicle Charging Points**<br>How many charging points are to be provided? |
| • **Car Parking Spaces**<br>How may car parking spaces are proposed? |
| • **Cycle parking**<br>How many spaces are to be provided?<br>How many electric cycle charging points are provided?<br>How much cycle parking is secure/covered?<br>(Ref: DQF/NSDG criteria 1.3 to 1.6) |
| • **Sustainable Transport**<br>Does the proposal promote opportunities for active travel?<br>What other sustainable proposals are aimed at actively encouraging walking, cycling or public transport as the first choice for daily activities?<br>Does the proposal support the concept of the 15 minute neighbourhood?<br>What provision for safe and attractive walking and cycling routes are included?<br>How do these link to local facilities, including schools, and public transport routes?<br>How do these connect safely to and enhance existing and proposed footpath, footway and cycle networks?<br>Are there any dedicated routes for pedestrians and cyclists?<br>What other sustainable transport measures are proposed (eg. location; travel passes; car sharing)? |

In relation to Waste/Re-cycling, the following LAPP Policies are key:

- CC1: Sustainable Design and Construction
- DE1: Building Design and Use

| **Waste/Re-cycling** |
| --- |
| • **Minimising the use of primary minerals**<br>Detail the use renewable materials, recycled and secondary aggregates, and other recycled and reused materials.<br>Does the proposal re-use of demolition/excavation material from the proposed works on site? |
| • **Waste storage**<br>What is the proposed bin storage capacity? |
| • **Re-cycling**<br>What measures are included for recycling and composting? |

**Enforcement/Monitoring**

To ensure the new buildings incorporate carbon reducing measures, a condition may be attached to the planning permission requiring the agreed sustainability measures to be implemented prior to occupation of the development and documentary evidence of the relevant features and measures should be submitted to the Council.

# Appendix 2: Sustainable development and construction principles guidance

### Net Zero Carbon Buildings

The illustration below (see Figure 4) details ways to achieve zero Carbon in new buildings. They can be employed to varying degrees in order to significantly reduce carbon in both the construction of the building and in the energy used by the building. Whilst the City Council promotes their consideration, the specific choice of the means of reducing carbon will be a matter for each developer, and the Council will not prescribe any particular approach beyond what is already required in the adopted Local Plan.

### Maximising Site Potential

Solar orientation, layout and glazing

Using the suns energy and surrounding climate called passive solar design can achieve natural heating and cooling of a building. Solar Heat Gain is the increase in temperature of a building that is caused by solar radiation i.e. the heat from the sun. This heating is the result of short-wave radiation heating the interior of a building directly through an opening such as a window or indirectly hearting the fabric of the structure or both. Solar gain can be beneficial in winter, however, with longer sunlight hours and more intense sunlight during the summer months it may create the problem of overheating and the need for ventilation and cooling systems. A building can retain this solar gain by having high thermal mass or can avoid it by using reflective materials and insulation. Both have their use depending on the heating needs of the building. If a building would benefit from the heat from the sun, construction materials which transmit this radiation can be used and the building designed so that its structure will be exposed to as much solar radiation as possible. Openings are generally the greatest direct form of solar gain, especially windows, therefore their size, position, orientation and materials have a significant effect on solar gain.

Where necessary, solar gain can be reduced by limiting the size of doors and windows, using reflective materials on the glass and building fabric, insulating walls and roof spaces to prevent indirect solar gains into the building, and ventilating roof spaces.

It is possible to use special reflective glass, in cavity venetian blinds and architectural features such as shading in the form of porches, screening to limit solar gain. However from a carbon neutral perspective any shading needs to be balanced against the potential need for increased lighting internally.

The thermal mass of a building can be used to even-out heating and cooling requirements throughout the day by storing solar gains accumulated during the daytime and then releasing them slowly during corer times such as night time.

As a general principle, the building should be orientated to take maximum advantage of the sun’s energy without leading to overheating in the summer.

The Passivhaus guidelines are that orientation should be preferably on an east to west axis and so the building is orientated within 30 degrees of due south as shown in Figure 5 below. Frequently used and habitable rooms should be on the southern elevation.

Figure 4: UK Green Building Council Net Zero Carbon Buildings definition

**Steps to Achieving a Net Zero Carbon Building**

**1. Establish Net Zero Carbon Scope***

1.1 Net zero carbon – **construction**

1.2 Net zero carbon – **operational energy**

**2. Reduce Construction Impacts**

2.1 A whole life carbon assessment should be undertaken and disclosed for all construction projects to drive carbon reductions

2.2 The embodied carbon impacts from the product and construction stages should be measured and offset at practical completion

**3. Reduce Operational Energy Use**

3.1 Reductions in energy demand and consumption should be prioritised over all other measures.

3.2 In-use energy consumption should be calculated and publicly disclosed on an annual basis.

**4. Increase Renewable Energy Supply**

4.1 On-site renewable energy source should be prioritised

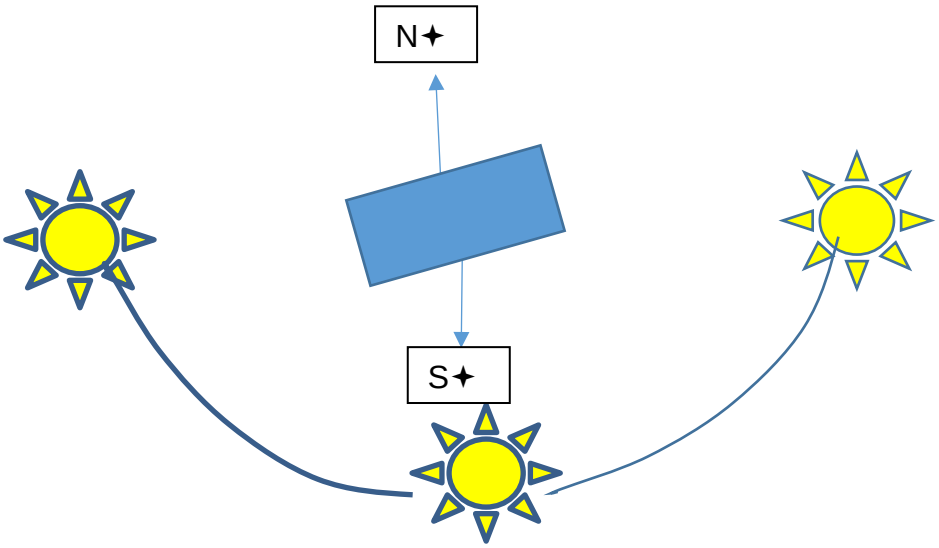
4.2 Off-site renewables should demonstrate additionality

**5. Offset Any Remaining Carbon**

5.1 Any remaining carbon should be offset using a recognised offsetting framework

5.2 The amount of offsets used should be publicly disclosed

Figure 5: Preferred housing orientation




Where it is not practical or possible to orientate buildings to an east west, a north to south alignment should be used to maximise morning and evening sunshine. In such cases habitable rooms should be on the western elevation to maximise heat and light in the evenings which can reduce the need or timing of heating these rooms (see Figure 6 below). In both cases, consideration should be given to the size and position of window openings including the use of large glazing units being at least sufficient to provide adequate daylight to reduce the need for lighting and energy use. In general, most glazing should be on the south side.

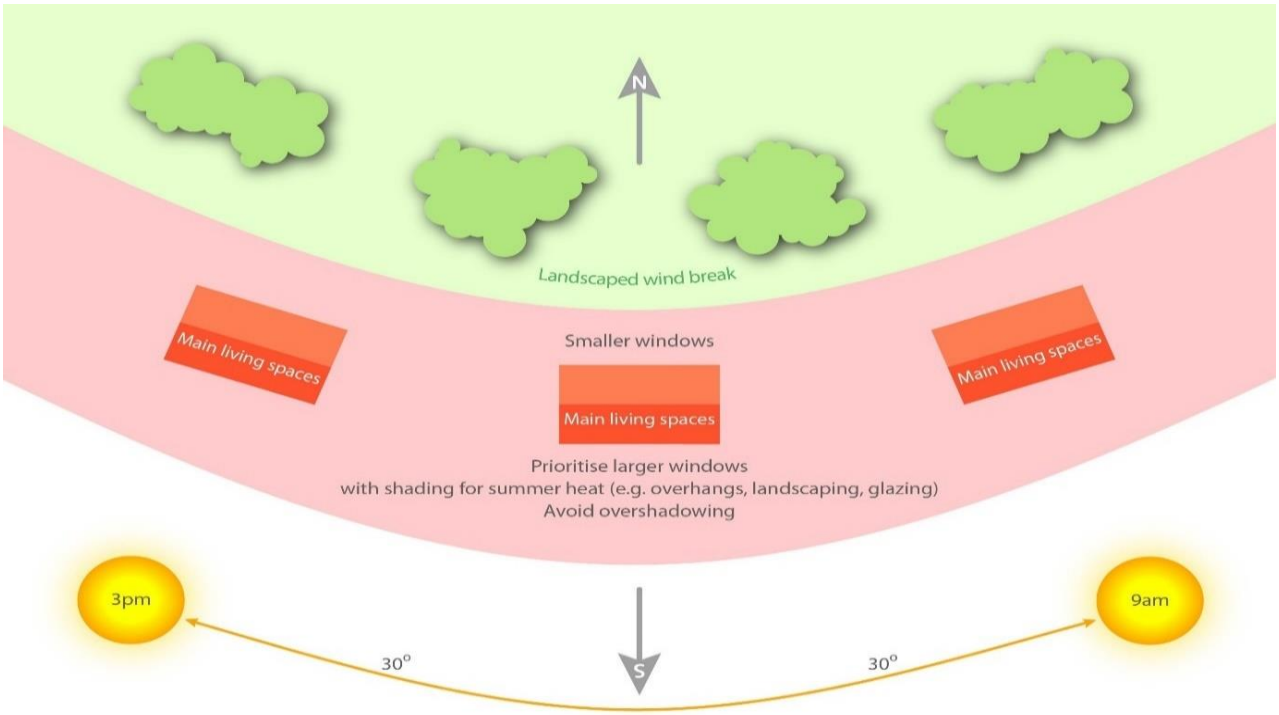
Even where rooms face north it is possible to admit sunlight by considering design solutions, for example, the house could be split in such a way that rather than the roof being equal on both sides one half is dropped to allow for clerestory glazing at the highpoint to capture southern sun light.

The building size and compactness also has a major effect on energy consumption. Generally, more compact forms with a low surface area to volume ratio being the most energy efficient. The building fabric especially the level of insulation is critical to achieving greater gains from passive solar energy although the standards for energy efficiency in homes is outside the scope of these guidelines. The Passivhaus principles for maximising passive solar gain include:

- Massive insulation on average 300 mm thick
- Triple glazing;
- Air tightness; and
- Ventilation (see below)

The layout of homes on a site also needs to take account of the potential for passive solar gain in the context of not creating issues of overlooking, overbearing or overshadowing. Separation distances between residential units and their siting and orientation within the scheme relative to one another should seek to maximise solar gain across the scheme as a whole. The elevation with the most potential for solar gain should have a minimum distance of 11 m from the next building.

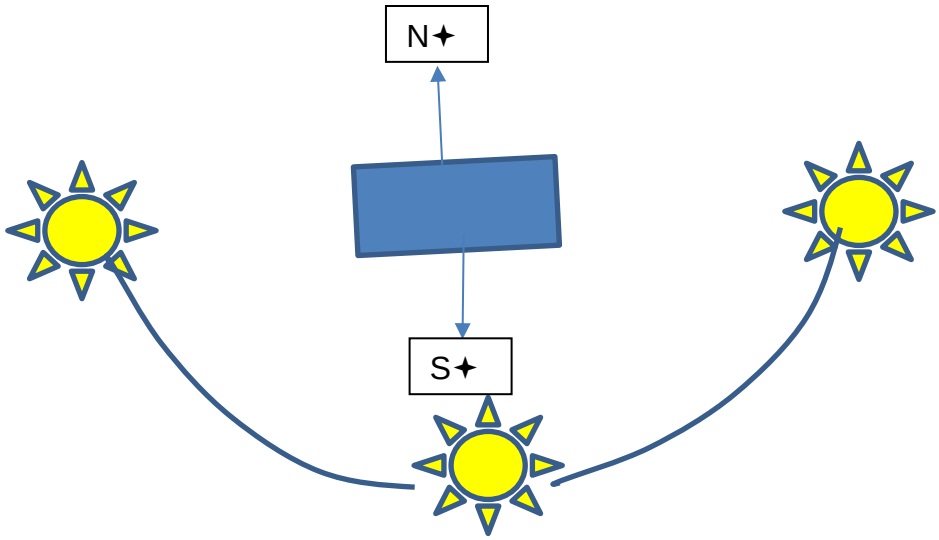
Figure 6: A north-south housing alignment




**Commercial buildings – offices**

These are best orientated in an east –west orientation with most glazing on the north side to avoid excessive heat gain, which can be an issue even in the winter months (see Figure 7). However, façade design that incorporates shading, solar assisted ventilation or heat balancing across north and south façade zones is also an important consideration.

Figure 7: Commercial/office orientated on an east–west axis



**Minimising Energy Use**

**Window areas per orientation**

**Window areas are a significant consideration when considering orientation. % of windows per orientation will have a significant impact on daylight, solar gain and the need for ventilation.**

*Window areas guidance for housing (% of wall area):*
North – minimum for good daylight and ventilation where needed: 10-20%
East - minimum for good daylight and ventilation where needed: 10-15%
South – maximised for solar gains in cold periods only (with shading for solar control in warm periods), daylight and ventilation 20-25%
West - minimum for good daylight and ventilation where needed, avoid excess in rooms likely to overheat: 10-15%

**Source: LETI**

**Glazing types**

Triple low-e glazed window panes with noble gas filling may be used with the glazing and frame having a U value of 0.8 W/(m2 K). Solar transmittance or g value should be 50% or more so as to allow more solar gain in winter months. Triple low e glazed slim units to fit wooden frames within Conservations Areas or heritage buildings may also be used.

**Ventilation**

The Building Regulations require very air tight forms of construction to improve energy efficiency and eliminate drafts for example, air tight fabric, taped and sealed wall joints. However, healthy homes need to be properly ventilated.

At its simplest passive ventilation can be achieved with all externally fitted windows being able to be opened. Skylights, roof glazing and clerestory windows can:

- allow a lot more light into the building, while reducing glare and improving privacy.
- increase solar gain in the living space and particularly in thermal mass placed on the north side of the home.
- when properly designed and positioned allow for natural cross ventilation and avoid overheating and also heat loss problems.

Mechanical ventilation may be extracted from the outside and pumped into the house through a heat exchanger where warm moist air from the house is pumped outward warming but not mixing with the incoming air.

**Thermal mass**

Using the materials of a building to moderate temperatures within it, thermal mass can be used to help prevent buildings overheating in summer and in winter, absorbing heat during the day and releasing it at night. Materials with a high thermal mass absorb heat during the day and release it during the night, helping to regulate the temperature, however this should be balanced against the material's embodied carbon as well as the merits of using reflective surfaces in combatting overheating. A high thermal mass construction could be a brick and bloc wall with a plaster finish. A timber framed wall has a lower thermal mass.

**Thermal comfort**

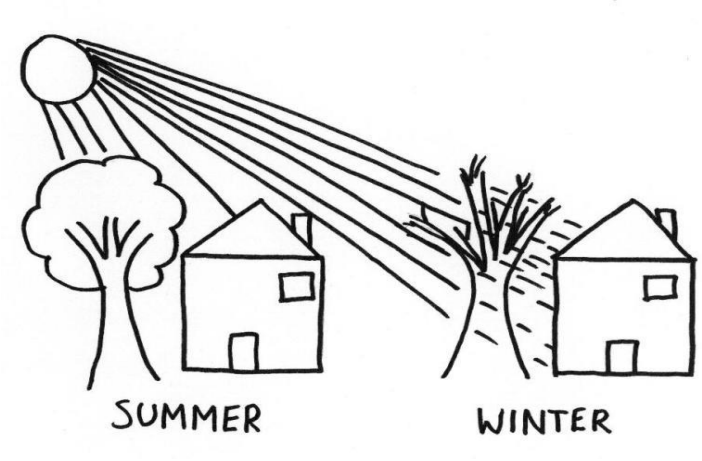
Thermal comfort is satisfaction with the thermal environment. In cold environments, the body loses more heat to the environment and in hot environments the body does not release enough heat. Both the hot and cold scenarios lead to discomfort. Maintaining thermal comfort for occupants of buildings is achieved through heating, ventilation, and air conditioning and is an important goal in building design.

**Landscaping and Green and Brown roofs**

Trees and landscaping reduce and attenuate surface water run-off, help improve air quality by absorbing particulate matter and improve biodiversity by creating habitats. Planting of mature standard trees can also help to minimise the relative heating of urban areas and can reduce the need for heating and cooling within buildings (they cool buildings and urban areas through evapotranspiration), therefore reducing carbon emissions. Landscaping can also attenuate rain water, reduce noise, and improve ones sense of well-being. Strategic planting of shrubs and trees can help protect buildings excessive summer heat through shading and also from wind. It can also provide visual amenity and enhance biodiversity in the area (see Figure 8).

However, it is important to choose the right plants, as they can require maintenance and irrigation which is challenging for a vertical or roof garden.

Figure 8: Light source in summer and winter




The same can be said of **Green and Brown Roofs** and **Green Walls**. Although a green or brown roof can technically be installed on any pitch of roof, it becomes more difficult and expensive the steeper the pitch.

**Sustainable Drainage Systems**

SUDS seek to capture, delay or manage surface water flooding to copy natural drainage by adopting techniques that deal with surface water through collection, storage and filtering before it is released back into the environment. In addition to reducing flood risk from surface water flooding there are many benefits including a higher quality of environment and enhanced biodiversity.

Examples of types of SUDS include:

- Basins and ponds
- Permeable surfaces
- Filter strips and drains
- swales

The design of surface water drainage should be considered at the earliest possible stages of the planning process. Ground conditions, in particular permeability, need to be considered, although many SUDS measures are feasible without good infiltration e.g. storage in an underground reservoir (such as a crushed stone layer) before soaking into the ground.

Circumstances where SUDS may not be possible include contaminated sites and brownfield sites with an existing drainage system. If SUDS cannot be provided on site, consideration should be given to making a contribution to off-site measures.

SUDS measures should be maintained in perpetuity through suitable management arrangements, unless they form part of the highway network's drainage system. The design of SUDS should be multifunctional with opportunities for wildlife and recreation.

**Urban Heat Island**

The above needs to be considered in the context of Nottingham City being an Urban Heat Island (UHI). The core urban area is a lot warmer than the suburban and rural areas surrounding it as 'additional' heat is created by energy from all the homes, people, cars, buses, trains and trams. Dwellings, shops, and industrial buildings are constructed close together and therefore hold in heat. This insulation makes the areas around buildings warmer. "Waste heat" also contributes to a UHI. People are always burning off energy, whether they're jogging, driving, or just living their day-to-day lives. The energy we burn off then escapes in the form of heat. Nottingham City is comparatively densely populated, and attracts people for jobs, retail and leisure, meaning there is a concentration of people. The more dense built environment means waste heat—and heat that escapes insulation means that it lingers in and between buildings in the UHI.

Night-time temperatures in UHIs remain high. This is because buildings, streets, and car parking block heat coming from the ground from rising into the cooler sky contributing to warmer temperatures.

Urban heat islands can have worse air and water quality than other areas and potentially lower air quality because there are more pollutants (waste products from vehicles, commerce, and people) being pumped into the air. These pollutants can be blocked from dispersing and becoming less toxic by the urban landscape. Water quality can also suffer when warm water from the UHI ends up flowing into local streams, it stressing native species that have adapted to a cooler aquatic environment.

When it's really hot, many of us run straight to the fan or the air conditioning. This is especially true in urban areas that suffer from urban heat island effects.

As stated previously, the potential overheating can be reduced by incorporating green roofs, and walls and as plants absorb carbon dioxide, a leading pollutant they can also improve air quality. Using lighter-coloured materials on buildings helps reflect more sunlight and trap less heat.

**The Circular Economy**

Sustainable development embraces the concepts of a **circular economy.** This is a model of production and consumption, which involves reusing, repairing, refurbishing and recycling existing materials and products as long as possible. The aim is to tackle global challenges like climate change, biodiversity loss, waste, and pollution by emphasizing the design-based implementation

of the three base principles of; eliminating waste and pollution, circulating products and materials, and regenerating nature.

Design to reduce waste during the occupancy of a building includes the incorporation of adequate space for segregation and storage of recyclables, and food waste. Information is obtained from the developer on the projected waste streams including the type and quantity of recyclable materials generated by building users which informs the required facilities onsite. Further advice can be obtained from the Council's Commercial Waste Team.

# Glossary

**Aerosols** - are defined as microscopic liquid or solid particles that enter the atmosphere through natural and man-made processes. Aerosols are more complicated than the typical greenhouse gas.

**Air tightness** - Air leakage is measured as the rate of leakage per m2 of external envelope per hour at an artificial pressure differential through the envelope of 50 Pa. i.e. x m3/hr/m2@50Pa.

**Anthropogenic emissions** - environmental pollution and pollutants originating in human activity such as anthropogenic emissions of sulphur dioxide.

**BREEAM Standards** - widely used means of reviewing and improving the environmental performance of buildings. BREEAM assessment methods generally apply to commercial developments (industrial, retail etc), however, it can be used to assess multi-occupancy residential buildings.

**Carbon Off-setting** - Carbon offset means the increased carbon dioxide emissions from a new development are balanced by savings in carbon dioxide elsewhere, by making payment into a carbon offset fund.

**Climate change adaptation** - Adjustments to natural or human systems in response to actual or expected climatic factors or their effects, including from changes in rainfall and rising temperatures.

**Climate change mitigation** - Action to reduce the impact of human activity on the climate system, primarily though reducing greenhouse gas emissions.

**Code For Sustainable Homes -** An environmental assessment method for rating and certifying the performance of new homes in the United Kingdom.

**Design Quality Framework** (DQF) **-** a series of guides to help applicants make better design choices for their building projects and to meet Nottingham City Council planning requirements more easily. Design Quality Framework

**Dwelling Emissions Rate (DER)** - The DER is the estimated carbon dioxide emissions per m2 per year (Kg/CO2/m2/year) for the dwelling, as designed. It accounts for energy used in heating, fixed cooling, hot water and lighting.

**Embedded Carbon** - refers to the GHG emissions associated with the manufacturing, maintenance, and decommissioning of a structure. It has been estimated that approximately 20% of GHG emissions are embodied in the construction sector.

**Embodied Carbon** - Embodied carbon means all the CO2 emitted in producing materials. It is estimated from the energy used to extract and transport raw materials as well as emissions from manufacturing processes. Further information on this is available at https://www.leti.london.

**G Value** – is how well glass transmits heat from the sun. It is expressed either as a percentage, or simple decimal. A g value of 1.0 (100%) would tell us that all solar heat could enter the building (i.e. without any glass), and of 0 (0%) would be for an opaque material with no solar energy transmittance.

**Green house gases** - The greenhouse effect is a warming of Earth's surface and the air above it. It is caused by gases in the air that trap energy from the Sun. These heat-trapping gases are called greenhouse gases. The most common greenhouse gases are water vapor, carbon dioxide, and methane.

**Imported Carbon Consumption -** the carbon locked into goods, food and services that are brought into the area

**Liquid Metal Battery -** comprised of a liquid calcium alloy anode, a molten salt electrolyte and a cathode comprised of solid particles of antimony, enabling the use of low-cost materials and a low number of steps in the cell assembly process. With a long cycle life, high rate capability, and facile cell fabrication, liquid metal batteries are regarded as a promising energy storage technology to achieve better utilization of intermittent renewable energy sources.

**Net Zero Carbon – Construction -** When the amount of carbon emissions associated with a building's product and construction stages up to practical completion is zero or negative, through the use of offsets or the net export of on-site renewable energy. (source: UK Green Building Council)

**Net Zero Carbon – Operational Energy -** When the amount of carbon emissions associated with the building's operational energy on an annual basis is zero or negative. A net zero carbon building is highly energy efficient and powered from on-site and/or off-site renewable energy sources, with any remaining carbon balance offset. (source: UK Green Building Council)

**Passivhaus** - Developed in Germany in the 1990s, Passivhaus is a quality assured standard and methodology for low energy building, which can help create buildings which use significantly less energy than current standard practice. It seeks to eliminate the need for space heating and cooling and is based on the principle that reducing heating loss to a minimum is the most cost-effective and most robust way of achieving a low carbon building.

**Regulated emissions** - Energy consumed in the operation of the space heating/cooling and hot-water systems, ventilation, internal lighting.

**U Value** - The U-value is a measure of how readily heat will flow through the structure, and describes how much energy in Watts (W) can pass through 1m2 of material from inside to outside at a temperature differential of 1 Kelvin (K), or 1°C.

# Sources of further information

- **BREEAM –** www.breeam.com
  Sustainable refurbishment of domestic buildings using BREEAM.
- **Building Research Establishment –** bregroup.com
- **Carbon Neutral Design Guide -** https://www.dqfnottingham.org.uk/carbon-neutral-design-guide
- **Carbon Neutral Design Review Panel** - https://www.dqfnottingham.org.uk/cn-review-panel
- **Carbon Trust** – www.carbontrust.com
- **DfT Gear Change Strategy Report, July 2020 - Gear Change: one-year-on review - GOV.UK (www.gov.uk) and accompanying DfT Local Transport Note 1/20 - Cycle infrastructure design (LTN 1/20) - GOV.UK (www.gov.uk)**
  Aims to further growth in cycling but also in the quality and quantity of cycle infrastructure.
- **Energy Saving Trust** – www.energysavingtrust.org.uk
- **Historic England -** Energy Efficiency and Historic Buildings | Historic England
  Guidance on a variety of energy efficiency and renewable energy interventions for historic buildings and conservation areas.
- **Improving Consistency in Whole Life Carbon Assessment and Reporting May 2021**: Carbon Definitions for the Built Environment, Buildings and Infrastructure - Microsoft Word - 20210525.WLCN.LETI.Carbon Definitions Version 'A'.docx (asbp.org.uk)
- **LETI** – www.leti.london
  Including guidance on metrics.
  **National Planning Policy Framework (Section 14)** - www.gov.uk/guidance/national-planning-policy-framework
- **NHBC Foundation -** https://www.nhbcfoundation.org/wp-content/uploads/2016/10/NF-72-NHBC-Foundation_Shape-and-Form.pdf
- **Passive Design Guide -** https://www.dqfnottingham.org.uk/passive-design
- **Passive House requirements -** www.passivhaustrust.org.uk
- **Planning Practice Guidance** - https://www.gov.uk/government/collections/planning-practice-guidance
  Examples of mitigating climate change by reducing emissions:
  - Reducing the need to travel and providing for sustainable transport
  - Providing opportunities for renewable and low carbon energy technologies
  - Providing opportunities for decentralised energy and heating
  - Promoting low carbon design approaches to reduce energy consumption in buildings, such as passive solar design
- **RIBA -** https://www.architecture.com/knowledge-and-resources/resources-landing-page/sustainable-outcomes-guide.
- **Sustainable Urban Drainage - Susdrain -** https://www.susdrain.org/delivering-suds/using-suds/background/sustainable-drainage.html
  Sustainable Urban Drainage guidance, and the The SuDS Manual (C753), CIRIA
- **The AECB Building Standard**
  Aimed at those wishing to create high-performance buildings including a Lifetime Carbon Standard that encourages designers to aim for an optimum balance of operational and embodied carbon - https://aecb.net/aecb-building-certification/
- **Transport Decarbonisation Strategy - Transport decarbonisation plan - GOV.UK (**www.gov.uk**)**
  Making cycling and walking the default modes for shorter trips in urban areas.
- **UK Green Building Council**
  Net Zero Carbon Buildings: A Framework Definition

https://www.ukgbc.org/ukgbc-work/net-zero-carbon-buildings-a-framework-definition/
Delivering Net Zero for commercial retrofits
https://www.ukgbc.org/ukgbc-work/commercial-retrofit-key-considerations

- **World Green Building Council -** https://www.worldgbc.org/green-building-sustainable-development-goals
  Guidance on sustainable development goals.