Low carbon planning guidance for Gedling Borough

May 2021

Cover Photo: Modular Housing Gedling Colliery Chase Farm

Gedling Borough Council

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Executive summary

Nottinghamshire councils have jointly prepared planning guidance on low carbon development in order to help the relevant councils to achieve their stated objectives of reducing carbon emissions. This jointly prepared document 'Low Carbon Guidance for Nottinghamshire Councils' provides a foundation for the various Councils to take forward the low carbon agenda as they see fit through the planning system. Each Council may deliver relevant policies through the preparation of local plans, supplementary planning guidance and non-statutory planning guidance or an appropriate combination of these.

Most Nottinghamshire councils (including Broxtowe, Gedling, Mansfield, Newark & Sherwood and Nottingham City) have declared individual climate emergencies or made a commitment to urgent action to address climate change. Some of these Councils have set ambitious targets to be carbon neutral varying between 2027 and 2030. Gedling Borough Council has declared a climate emergency and has a target of 2030 to be carbon neutral.

This document 'Low Carbon Planning Guidance for Gedling Borough' is based on the Nottinghamshire Guidance, which has been adapted to meet the particular local circumstances for Gedling Borough.

The overarching Policy for addressing Climate Change in Gedling Borough is currently Aligned Core Strategy (ACS) Policy 1: Climate Change. Other adopted policies in the ACS and the Gedling Borough Local Planning Document are also relevant to the low carbon agenda and highlighted in this document. This guidance augments these adopted Local Plan planning policies and sets out practical measures in order to help assist developers in planning applications for major development.

1.0 Purpose of the planning guidance

1.1 This planning guidance augments adopted Local Plan policies for Gedling Borough, which are set out in chapter 3. Once approved by Gedling Borough Council as non-statutory planning guidance it may be a material consideration in determining major planning applications.

1.2 The planning guidance is intended to provide:

- Practical guidance on forms of sustainable design and construction;
- Guidance to help inform planning applications for major development and the development management process;
- Sign-posting to best practice examples and guidance; and
- A checklist guide for developers to assist in the submission of major planning applications (**Appendix 1**).

2.0 Introduction

2.1 Nottinghamshire councils have jointly prepared planning guidance on low carbon development in order to help the relevant councils to achieve their stated objectives of reducing carbon emissions. This document provides a foundation for the various councils to take forward the low carbon agenda as they see fit through the planning system.

2.2 Gedling Borough Council has declared a climate emergency and has a target of 2030 to be carbon neutral. If these targets are to be met there needs to be a step change in terms of delivering more sustainable design and construction and zero carbon buildings in the next few years.

2.3 This document 'Low Carbon Planning Guidance for Gedling Borough' is based on the Nottinghamshire planning guidance, which has been adapted to meet the particular local circumstances for Gedling Borough.

2.4 The overarching Policy for addressing Climate Change in Gedling Borough is currently Aligned Core Strategy (ACS) Policy 1: Climate Change. Other adopted policies in the ACS and the Gedling Borough Local Planning

Document are also relevant to the low carbon agenda and highlighted in this document. This guidance augments these adopted Local Plan planning policies and sets out practical measures to assist developers in making planning applications. Once approved as non-statutory planning guidance, this document will be a material consideration in determining major planning applications.

2.5 This document provides planning guidance that is not prescriptive but rather recognises that achieving sustainable design and low carbon development is achievable through a variety of ways. In this context, it contains practical guidance and refers to certain standards that are considered a good benchmark for achieving sustainable construction and design and low carbon development such as Building for a Healthy Life and Passivhaus.

2.6 The planning guidance set out in this document applies to major development proposals, defined as 10 dwellings or more or commercial developments over one hectare or 1,000 sq. m. or more. It includes a checklist for use by development management officers and for developers when submitting planning applications. The checklist distinguishes between what should be delivered under the current policies and those more aspirational aims that may become requirements in anticipation of changing national and local planning policies in the future.

Photo Solar Farm at the former Gedling Colliery

3.0 Policy context

National legislation, Planning Policy and Practice Guidance

3.1 Section 19 of the Planning and Compulsory Purchase Act 2004 requires local planning authorities (LPAs) to include Local Plan policies, which are designed to secure the development and the use of land that, contribute to the mitigation of, and adaptation to, climate change[1].

3.2 The Planning and Energy Act 2008 allows LPAs to set energy efficiency standards in their development plans policies that exceed the energy efficiency standards set out in the building regulations. However, this is not a matter for this non-statutory guidance but may be considered as part of future local plan preparation.

3.3 The NPPF 2019 (paragraph 149) 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 in line with objectives and provisions of the Climate Change Act (2008).

3.4 In line with this, the NPPF 2019 (paragraph 150) states that:
'*New development should be planned for in ways that: a) avoid increased vulnerability to the range of impacts arising from climate change. When new development is brought forward in areas which are vulnerable, care should be taken to ensure that risks can be managed through suitable adaptation measures, including through the planning of green infrastructure; and b) can help to reduce greenhouse gas emissions, such as through its location, orientation and design. Any local requirements for the sustainability of buildings should reflect the Government's policy for national technical standards*'.

3.5 Government Planning Practice Guidance[2] advises how suitable mitigation and adaptation measures can be implemented in the planning process in order to address the impacts of climate change. This focuses on win-win solutions, for example:

- by maximising summer cooling through natural ventilation in buildings and avoiding solar gain;
- through district heating networks that include tri-generation (combined cooling, heat and power); or

[1] Link to the Planning and Compulsory Purchase Act 2004
[2] Link to UK Government and Guidance on Climate Change

- through the provision of multi-functional green infrastructure, which can reduce urban heat islands, manage flooding and help species adapt to climate change – as well as contributing to a pleasant environment which encourages people to walk and cycle.

Building Regulations

3.6 The government recently consulted on Future Homes Standards in 2019 with the aim of bringing these new standards into force in 2025. The proposals amount to a near zero carbon Future Homes Standard based on producing 75-80% less CO_2 emissions than one built to current requirements. The intention is to future proof new homes for low carbon heating systems and meet higher standards of energy efficiency.

3.7 The Government has 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. Crucially, the Government has confirmed that to provide some certainty in the immediate term, it will not amend the Planning and Energy Act 2008, which means that local authorities will retain powers to set local energy efficiency standards for new homes in their local plans.

3.8 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 per cent less carbon emissions than allowed under the current regulations. As a first step, from 2021 all new homes will be expected to produce 31 per cent lower carbon emissions as part of an 'interim uplift' in Part L standards. The government confirmed that from 2025 it does not want any new home to 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. At the time of writing, the proposed changes to the Building Regulations are the subject of a detailed consultation. The government has also announced a consultation on higher performance targets for non-domestic buildings, which will also have to be 'zero carbon ready' by 2025.

3.9 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.

Gedling Borough Local Plan

3.10 The Gedling Borough Local Plan consists of Part 1: The Aligned Core Strategy (2014); and Part 2: the Local Planning Document for Gedling Borough (2018). These are available from the link at the bottom of this page[3].

ACS Policy 1: Climate Change

3.11 The Local Plan for Gedling Borough, prepared in conformity with national legislation, national planning policy and national planning guidance set out above, includes a number of planning policies addressing climate change notably Aligned Core Strategy Policy 1: Climate Change. The key sustainability criteria of Climate Change Policy 1 are set out in Parts 1 to 3 of the policy (reproduced below). This policy specifically addresses a number of key design principles to maximise the resilience of development, whilst also maximising opportunities to mitigate the impact of climate change. The policy ensures that any development must account for short and long-term changes resulting from climatic changes through development design, location, form, materials and construction. It applies to new development as well as refurbishment requiring planning permission.

Photo new housing Gedling Colliery/Chase Farm

[3] Link to Gedling Borough Local Plan Part 1 and Part 2

ACS Policy 1: Climate Change Parts 1 to 4

1. All development proposals will be expected to mitigate against and adapt to climate change, to comply with national and contribute to local targets on reducing carbon emissions and energy use unless it can be demonstrated that compliance with the policy is not viable or feasible.

2. Sustainable Design and Adaptation 2. Development, including refurbishment where it requires planning permission, will be expected to take account of the following: a) how it makes effective use of sustainably sourced resources and materials, minimises waste, and water use. For residential development, planned water use should be no more than 105 litres per person per day; b) how it is located, laid out, sited and designed to withstand the long and short term impacts of climate change, particularly the effect of rising temperatures, sustained periods of high temperatures and periods of intense rain and storms; c) that the building form and its construction allows for adaptation to future changes in climate; and d) that the building form and its construction permits further reduction in the building's carbon footprint, where feasible and viable.

Reducing Carbon Dioxide Emissions

3. Development should demonstrate how carbon dioxide emissions have been minimised in accordance with the following energy hierarchy:
   a) Using less energy through energy efficient building design and construction, including thermal insulation, passive ventilation and cooling;
   b) Utilising energy efficient supplies – including connecting to available heat and power networks; and
   c) Maximising use of renewable and low carbon energy generation system.

4. Further guidance on how development should contribute to reducing carbon dioxide emissions will be set out in part 2 Local Plans, where appropriate.

3.12 Other policies in the ACS of relevance include ACS Policy 2, which steers development to sustainable locations and promoting public transport, cycling and walking. Policy 7 identifies priorities for regeneration. Policy 10 provides guidance on the design of development. Policy 18 seeks to make provision for green and blue infrastructure in new development and for its integration into existing green infrastructure networks.

Relevant Policies in the Local Planning Document 2018

3.13 Policy LPD 3 deals with managing flood risk; Policy LPD 4 requires sustainable urban drainage solutions for all proposed development where practical. Of particular relevance to sustainable design is Policy LPD 35: Safe Accessible and Inclusive Development. Relevant parts of Policy LPD 35 are reproduced below.

Relevant parts of Policy LPD 35 Safe, Accessible and Inclusive Development include:

Planning permission will be granted for development proposals provided:

A) The proposal provides streets and spaces that:

- create or contribute towards a simple, well-defined and inter-connected network of streets and spaces that allows for convenient access to a choice of movement modes and routes, as appropriate to the size of the development and grain of the surroundings, without compromising the security of the development;
- provide direct, clear, safe and attractive links to existing routes, local and wider services, amenities and facilities including public transport;
- ensure that the layout, scale and enclosure of streets and spaces are appropriate to their function, character, capacity, hierarchy and local climatic conditions;
- incorporate existing and new green infrastructure to reinforce the character of streets and spaces; and
- takes account of the needs of all users, including those with protected characteristics especially where more prevalent in the local area.

B) The proposal provides a layout and form of development, including the size, shape, form and configuration of blocks and plots, which:

- achieves continuity of development edge that encloses and clearly defines the public realm whilst physically securing the private realm; and
- responds appropriately to local climatic conditions including solar orientation and prevailing winds to maximise the opportunities for energy efficient design, renewable energy generation and access to sunlight within the development, while minimising the negative effects of wind including wind turbulence and funnelling

3.14 The key policy context and principles are set out above, the following guidance is intended to inform the development management process and a checklist is provided at **Appendix 1** setting out the evidence needed to support the consideration of planning applications for major development.

4.0 Sustainable development and construction principles, guidance for Developers

4.1 This planning guidance focuses on how new development can design in and embed carbon reduction measures and this will likely depend on the scale, type and location. It is not the aim of this guidance to prescribe any particular approach, but it is also clear that new development can do much to affect positive change. A checklist guide to assist developers in submitting major planning applications is attached as **Appendix 1**.

Low Carbon Planning Guidance Planning Policy 1

Major development proposals will be required to include information on the sustainability and low carbon credentials of the development proposal in accordance with the requirements for outline or full planning applications as set out in the Checklist in Appendix 1. For information indicated as aspirational requirements, developers are encouraged to provide this information to ensure development is as sustainable as possible. The information required or requested may be set out in the Design and Access Statement or a separate sustainability statement or in a combination of both these documents.

Sustainable layout and design ('whole building' and 'whole layout' considerations)

4.2 Sustainability has to be part of the whole design process, from the very start of the project. The field of sustainable design seeks to balance the needs of these areas by using an integrated approach to create "win-win-win" design solutions. The Government has produced National Design Guidance[4], which is relevant in this context. Building for a Healthier Life also provides key principles for sustainable design[5].

4.3 It is important that new development optimises the site's potential by considering how existing infrastructure and natural features (both nearby and on-site) can be best integrated and enhanced to help conserve energy, maximise renewable energy efficiency, improve air quality, enhance

[4] Link to UK Government website and Design Guide

[5] Link to urban design group website and the publication Building for a Healthier Life

biodiversity, avoid and reduce flooding and improve the uptake of sustainable modes of transport (walking, cycling and bus).

4.4 When planning for and designing layouts, this needs to consider aspects such as building orientation, access to sustainable transport, connectivity, green infrastructure, water conservation and management, biodiversity net gains, etc. from the on-set of the design process. In doing so this can reduce costs and time by beginning to integrate crosscutting policy needs early on in the process. Pre-application discussions and information gathering processes are encouraged to address the following:

- Considering different layout options to achieve maximum solar gain and integration of solar panels;
- Connectivity to existing community facilities, jobs and green infrastructure, bus routes and walking and cycling routes;
- Connectivity within the development to maximise routes that reduce car travel within the development and also seek to improve physical and mental wellbeing;
- Avoidance of flood risk through the use of sustainable drainage systems (SuDS) and how these can also can also minimise impacts and enhance water quality, amenity and biodiversity;
- Protecting and enhancing biodiversity on and adjacent to the site by understanding what should be conserved but also enhanced within the development and the relationship with nearby ecological networks and designated sites and to contribute to net gains in biodiversity;
- Design and integration of landscaping along busy roads and providing off-road walking and cycling green corridors in order to avoid and minimise impacts and improve air quality; and
- Design and integration of open spaces and green networks to promote urban cooling, access to nature and healthy places.

Maximising site potential

Solar Orientation

4.5 Using the suns energy and surrounding climate is called passive solar design and can achieve natural heating and cooling of a building. This is complex as the amount and power of the sun changes with the seasons although it is possible to model the amount of sun throughout the day and year. As a general principle, the building should be orientated to take maximum advantage of the sun’s energy.

4.6 The Passivhaus[6] 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 1 below. Frequently used and habitable rooms should be on the southern elevation.

4.7 It is not always practical or possible to orientate buildings to an east west direction. For building sites with a north south axis, a north to south alignment maximises morning and evening sunshine. 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. 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.

4.8 Even where rooms face north it is possible to admit sunlight through using designs 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[7] at the highpoint to capture southern sun light.

4.9 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 are 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).

4.10 The layout of homes on a site also needs to take account of the potential for passive solar gain. Planning policies generally seek to ensure that new development does not create 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

[6] Passivhaus - Link to Passiv Haus website - what is passivhaus?
[7] A **clerestory** is an interior wall built above part of the roof with high windows to let in light.

most potential for solar gain should have a minimum distance of 11 m from the next building.

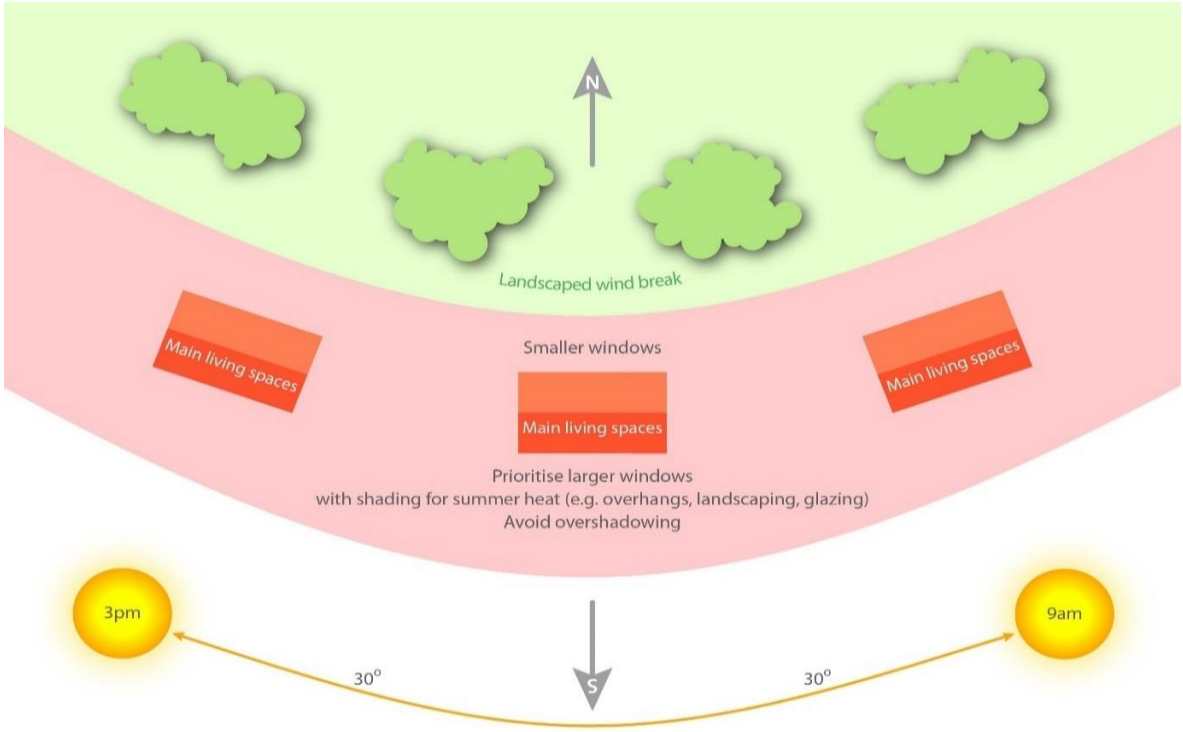

Figure 2: Solar Orientation residential dwellings

Commercial buildings – offices

4.11 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.

Figure 3: commercial/office orientated on an east – west axis

Minimising Energy Use

Glazing

4.12 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). Triple low-e glazed slim units to fit wooden frames within Conservations Areas or heritage buildings may also be used.

Thermal Mass

4.13 Thermal mass can be placed in the floor or walls of a building. This needs to be a dense and heavy material, which can act as a good heat conductor. A simple form is a concrete slab although this should be tiled rather than have a carpet covering. Thermal mass is best placed where it can absorb heat in the colder months of the year and be shaded in hotter months. Thermal mass absorbs heat in hot weather and can therefore have a cooling effect giving out heat when the temperature falls having a warming effect.

Insulation

4.14 Most homes are built with a cavity wall, which can be filled with insulation including foam insulation injected through the external wall. It is considered that many homes nationally and locally could benefit from this relatively easy and cheap form of insulation. Solid walls can also be insulated using solid wall insulation boards either on internal walls or on external walls.

EV points, Domestic lighting and household appliances

4.15 Electric or hybrid-electric powered vehicles currently form a small percentage of the total number of vehicles on the road. However, electric/hybrid vehicles will become more popular, further advances in technology are anticipated, and the likelihood is that these vehicles will become less expensive. External charging points should be provided for new homes. To allow for an easy upgrade to a Mode 3 (smart charging) in the future, the charging points must be supplied with a protected independent 16 amp radial circuit complying with BS7671 or equivalent; a 32 amp power supply would be advisable to future proof the development. Further guidance for developers on the mitigation required for new development is available in the Air Quality and Emissions Guidance for Developers[8].

[8] Link to Air Quality and Mitigation document - Guidance for Developers

4.16 Maximising solar gain through design and orientation is also the best means of making the most of natural light. Electrical lighting systems should be of the low energy type including for example, LEDs, compact fluorescent lamps and low energy bulbs.

Renewable Energy technology for buildings

4.17 There are a range of technologies available to deliver these requirements including; solar thermal panels, photovoltaic cells, small wind power generators, biomass heating and hot water systems, ground source heat pumps, air heat pumps, micro combined heat and power systems (powered by a renewable fuel source) or energy efficient ventilation systems.

Solar Panels, ground source heat pumps and air heat pumps

4.18 Solar panels also known as photovoltaic cells or PV capture the sun's energy and convert it into electricity. A roof area of 10 sq. m to 20 sq. m can deliver 20- 45% of the households electricity needs and the roof should ideally face south. Solar thermal panels can provide both hot water and electricity.

4.19 Ground source heat pumps capture the heat from underground, which has a relatively constant temperature of about 10 degrees C. The systems works on pipes laid under the ground in a loop with a mixture of water and antifreeze that is pumped around the loop. The loop heats up and passes through a heat exchanger to heat the home. Normally a fair sized garden area is required to accommodate the loop but they are relatively inexpensive to run and maintain. Air source heat pumps are an alternative normally placed at the side or back of a property. These take heat from the air and boost it to a higher temperature using a heat pump although this does require electricity to run but is likely to use cleaner energy and more efficient than gas boilers. They can be used to provide cooling ventilation during summer. Noise can be a potential issue with these installations.

Biomass Boilers

4.20 These appliances combust grown materials to produce heat and can be fitted with a back boiler to supply hot water. One disadvantage is that combustion can give off air pollution and it is important that sustainable materials are burned.

Protect and conserve water

4.21 Aligned Core Strategy Policy 1 includes a standard of up to 105 litres per person per day.

4.22 There are numerous installations within buildings that can conserve water including, low flush toilets, aerating taps, low flow showerheads and water butts.

Rainwater Harvesting

4.23 At its simplest this can be rainwater collection tubs connected to a drainpipe. However, more sophisticated systems including storing of rainwater collected from the roof of the building, which can either be gravity fed or pumped for purposes not requiring drinking water standards such as flushing toilets, washing machines or for watering the garden. Water can be harvested from green roofs (see above) although it is less clean and may have contaminants.

Recycling Grey Water

4.24 Water used in the home called grey water can after treatment be used for non-drinking water purposes for flushing toilets or watering the garden.

Building space and materials

4.25 The environmental impact of the main building materials should be considered. Examples of low impact materials are timber, earth, straw, secondary aggregates, locally produced or recycled products; high impact materials include plastic, steel and aluminium. Repair is generally preferable to reuse, reuse to recycling and recycling to disposal/new materials. When using timber, preference should be given to products from well managed, sustainable, certified sources e.g. Forest Stewardship Council (FSC). Environmental ratings are published in the BRE Green Guide[9] and BREEAM Standards[10].

Maximise indoor environmental quality

Ventilation

4.26 The Building Regulations and standards such as Passivhaus require very air tight forms of construction to improve energy efficiency and eliminate drafts for

[9] Link to BRE Green Guide
[10] Link to BREEAM Standards

example, air tight fabric, taped and sealed wall joints. However, healthy homes need to be properly ventilated.

4.27 At its simplest passive ventilation can be achieved with all externally fitted windows being able to be opened. Skylights and roof glazing can also be used to allow the free flow of air through a building for cooling purposes.

4.28 Mechanical ventilation involves air 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.

4.29 As stated above, thermal mass can have a cooling or warming effect. A high thermal mass construction could be a brick and block wall with a plaster finish. A timber framed wall has a lower thermal mass. Thermal mass helps prevent buildings overheating in summer and in winter, absorbs heat during the day and releases it at night.

Operation of buildings and their maintenance

4.30 Future proofing[11] of buildings is critical and important to build in at the design phase. The key objective should be to achieve a sustainable low energy building that is adaptable to social, technological, economic and regulatory change and seek to maximise the life cycle of the building and minimise operating costs. Flexibility is often seen to be key in this context so that the building can continue to be efficiently used well into the future. This could include for example, moveable partitions or adaptable multi use space. Building in resilience to climate change including increased temperature or flood risk should be considered.

Green infrastructure, including landscaping and green roofs

4.31 The integration of on-site green infrastructure (GI) provides multiple benefits such as reducing and attenuating surface water run-off, helping to improve air quality by absorbing particulate matter and restoring and enhancing biodiversity through habitat creation. These benefits are also known as ‘ecosystem services’ and help to regulate the impacts caused by climate change and also to help reduce CO2 emissions. The designing in of GI also provides health and

[11] Link to Designing Buildings WIKI website for Future Proofing Construction

wellbeing benefits for residents and can contribute to reduced energy costs, when designed in and utilised effectively.

4.32 Vegetated areas typically reflect more solar radiation away from the surface than dark, artificial surfaces. Consequently, less solar radiation will be absorbed, resulting in vegetated areas having cooler surfaces and lower air temperatures compared with built-up, non-vegetated areas. Vegetated areas also have lower heat storage capacities than many artificial materials and transfer energy rapidly to the air because of their multiple small leaves and branches which facilitate air movement.

4.33 The positive benefits from the integration of green infrastructure are reported in a European Commission publication on climate change and green infrastructure[12]. It reports that 'estimations have shown energy savings from green roofs at 15-45% of annual energy consumption, mainly from reducing costs for cooling. For example, in New York it was estimated that providing 50% green roof cover within the metropolitan area would lead to an average 0.1-0.8°C reduction in surface temperatures. It was noted that for every degree reduction in the urban heat island effect roughly 495 million KWh of energy would be saved. Urban trees also bring multiple benefits including energy savings from cooling and heating. A 20% tree canopy over a house results in annual cooling savings of 8 to 18% and annual heating savings of 2 to 8%'.

4.34 Research by Manchester Metropolitan University[13] also report the important roles that urban trees and grassed areas have in significantly reducing the heat island effect and reduce rainfall runoff.

4.35 This comes in many forms and scales, including, but not limited to:

- Green roofs and living walls
- Street trees, hedgerows, urban trees and woodland
- Open space and green corridors
- Semi-natural and natural habitats
- Sustainable drainage systems
- Allotments and community orchards and
- Walking and cycling routes / networks.

4.36 The following provides a short summary of benefits and sign-posting:

A) Green roofs and living walls – These reduce energy heating but also cooling costs and contribute, to some degree, to reductions in surface water run-off.

[12] [12] Link to EU Commission Document Green Infrastructure in the Energy Sector document

[13] Gill, S.E., Handley, J.F., Ennos, A.R. and Pauleit, S. (2007). Adapting cities for climate change: the role of green infrastructure. Built Environment 33 (1), 115–133.

These also improve the local air quality and can be integrated on a variety of scales. It is important that maintenance is addressed, as this is a critical factor in their success. They can greatly add to the aesthetics and also to the uptake of buildings. They soften the urban form and provide net gains in biodiversity.

B) Trees, hedgerows and other semi-natural and natural habitats – Urban trees and woodland, hedgerows and other habitats, including grassland and wetlands help to minimise the relative heating of urban areas and thus can reduce the need for heating and cooling within buildings (they cool buildings and urban areas through evapotranspiration), therefore reducing carbon emissions. Strategic planting of shrubs and trees can help protect buildings from excessive summer heat through shading and from wind. Trees, hedgerows and habitats also provide visual amenity, enhance biodiversity and improve air quality in the area. The location and type of species are important factors when integrating these into development. Key factors when choosing appropriate species mixes include: soil type, co-occurring needs (e.g. improving air quality and biodiversity), location (e.g. within an urban park, street tree or near to natural area), and management needs. The restoration and creation of semi-natural habitats should enhance nearby ecological connections, across local and landscape scales. Key elements for successful adaptation of habitats include according to Lawton[14]: better quality through enhancing existing wildlife sites and habitats through management, restoration and creation of habitats; and bigger by buffering existing habitats and enhanced connections to nearby habitats.

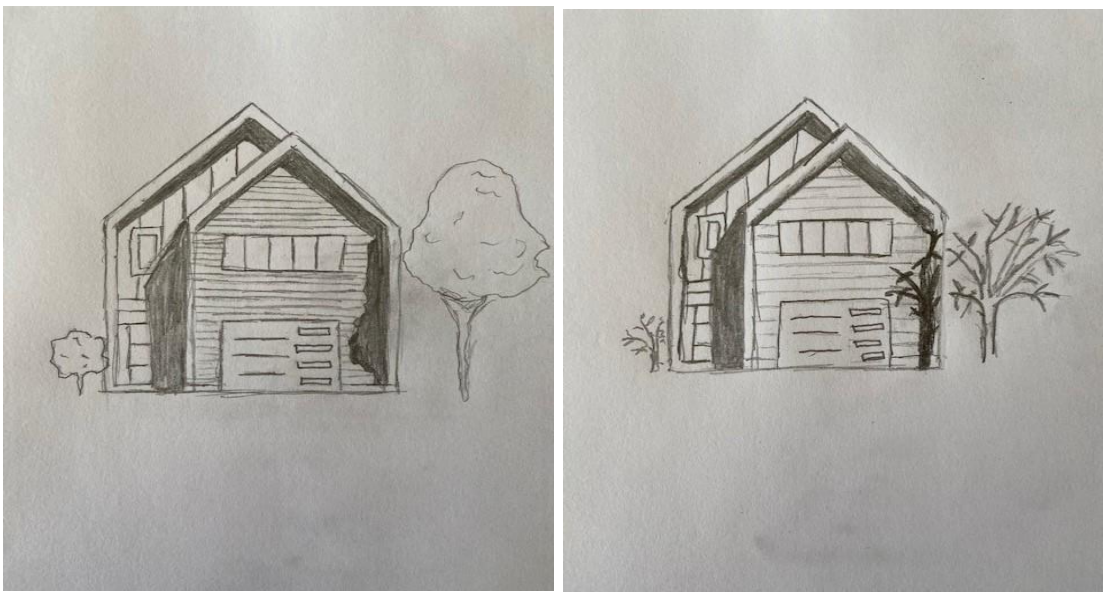

Figure 4: Deciduous trees provide natural shade in summer whilst allowing sunlight through in winter.

[14] 2010 Lawton Report – Making Space for Nature
https://webarchive.nationalarchives.gov.uk/20130402170324/http:/archive.defra.gov.uk/environment/biodiversity/documents/201009space-for-nature.pdf

C) Key resources include:
Urban Tree Manual:
link to Forest Research Website and urban tree manual

Link to UK Government web site and guidance on the natural environment

D) Urban parks and green corridors – The inclusion of urban green space not only creates healthier development, these also contribute to urban cooling and reduce run-off. The size of the greenspace is a key determinant: the bigger the greenspace, the greater the cooling effect, even some distance away. Other characteristics of greenspaces, which influence their cooling effectiveness, are their shape and density, the types of trees, shrubs and ground cover present in the greenspace, plant arrangement, the percentage of impervious area and topography. An increase in the ratio between perimeter and area of a greenspace, which increases the edge effect and the complexity of its shape, reduces the cooling intensity measured during the night. Adequate size of green space is approximately greater than 0.5 ha[15]. The integration of urban trees/ landscaping is also a key factor.

E) Sustainable Drainage Systems (SuDS) - 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, improved water quality and enhanced biodiversity. 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 reasonable 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. The Construction Industry Research and Information Association (CIRIA) provides excellent guidance set out in their SuDs Manual

[15] Forestry Research Note: The role of urban trees and greenspaces in reducing urban air temperatures Madalena Vaz Monteiro, Phillip Handley, James I. L . Morison and Kieron J. Doick, January 2019

2015 (CD73)[16]. New guidance on adoption of SuDs by utilities companies is provided below[17].

Sustainable Urban Drainage Systems (SuDs)

Examples of types of SuDS include:

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

- 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.
- One of the frequently cited barriers to SuDS is issues around adoption by water companies. However, water companies are now able to adopt SuDS provided they meet the definition of a sewer. For more information on this the reader is referred to the guidance in the footnote 16 below.

[16] Link to CIRIA SuDS Manual (C753)
[17] Link to Sewer Sector Guidance - A changed approach to surface water sewer management, Water UK

Best practice: Rain Garden, Ribblesdale Road, Sherwood, Nottingham
Type: Rain Garden
• Proven surface water capture and infiltration leading to reduced pressure on downstream sewer and watercourse.
• Increased understanding and awareness of the benefits of retrofit SuDS at a community and partner level.

This is a retrofit scheme to an existing Street, Ribblesdale Road a relatively quiet street with 67 properties. The road runs parallel to the Day Brook a heavily modified watercourse with relatively poor water quality as a result of diffuse pollution from its urban setting. This watercourse also poses a flood risk to a number of properties in the Nottingham area. The schemes comprises 21 linear garden structures along the grass verge linked to the highway drainage system. Comprising top soil and stone filtration with void space underneath they have a capacity sufficient to manage water runoff from 5,500 sq. m of highway. The infiltration system also removes contaminants from motor vehicles washed off the highway. The scheme has greatly reduced the amount of surface water discharged on the downstream sewer and watercourse.

Source: Susdrain and Nottingham City Council

Photo of Rain Garden Ribblesdale Road, Nottingham

E) Allotments and community gardens and orchards – these are important in helping to reduce food mileage, improve healthy lifestyle choices and support community cohesion. Integrating community gardens and orchards within urban environments can offer both healthy living and biodiversity benefits.

F) Green corridors and walking and cycling routes – supporting the use of sustainable alternatives to car travel is a key element of sustainable design and layout. Building for Life 12 Standard provides guidance on how to assess and achieve this[18]. Integrating open space and green corridors into routes where people want and need to travel are key factors to consider. Often desire lines within developable sites give clues as to how an area is used and, where possible, this should be used to inform enhanced walking and cycling routes within and out of a new development. Designing open spaces that have natural surveillance reduces risk in anti-social behaviour developing. The quality of these routes is a key factor.

Sustainability Statement

4.37 Sustainability statements either standalone or as part of the required Design and Access Statement are submitted to the LPA at the planning application stage typically require the developer to consider all aspects of development form which can contribute to securing high standards of sustainable development from the outset, including but not limited to:

- Energy efficiency 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.

[18] Link to Design Council Building-life-12-third-edition

Appendix 1: Sustainability checklist for major development proposals

(Major development is defined as 10 or more homes and commercial development of 1 ha or more or 1,000 sq. m and above).

This appendix should be read in conjunction with the guidance set out in the body of this document. The purpose of this appendix is to provide a checklist for use by applicant to understand the information to be provided in support of outline and full/reserved matter applications. The right hand column is included to set out the Council's direction of travel and indicate information that is likely to be required in the future.

Topic	Outline	Full/reserved matters	Aspirational
Sustainable Design, construction and climate change mitigation and adaptation			
• Encourage minimising the use of primary minerals e.g. in the use of renewable materials, recycled and secondary aggregates, and other recycled and reused materials. The Design and Access or Sustainability Statement should address this.			✓
• Encourage the re-use of demolition/excavation material from the proposed works on site? Please provide details of where material will be derived and where they will be used.			✓
• Encourage the minimisation of non-mineral construction waste (e.g. packaging, timber, plastics) on site.			✓
• Encourage use of locally sourced materials on site.			✓
• Encourage use of sustainably sourced materials?			✓
• Will the layout and design help to reduce the need to travel and promote use of non-private car modes of travel for example through good pedestrian and cycling connections and access to public transport. Is access to cycle and	✓	✓	

Topic	Outline	Full/reserved matters	Aspirational
other vehicle storage convenient and secure?			
• Has the layout of the site, landscaping and orientation of buildings taken account of solar gain and other environmental factors to reduce the need for mechanical heating and artificial lighting in the development?		✓	
• Will the internal layout of the buildings make best use of solar gain and natural light?		✓	
• Will passive cooling/ventilation measures be incorporated into the scheme? (commercial developments only)			✓
• Will the scheme include mechanical cooling or air conditioning and if so why are passive measures not adequate? (commercial developments only)			✓
• Will the scheme protect and enhance biodiversity and make provision for well-connected green and blue infrastructure on and off site	✓	✓	
Water Efficiency			
• If the scheme is for new dwellings will these be designed to the Aligned Core Strategy Policy 1 standard of 105 litres of water per person per day?		✓	
• Will water efficiency measures such as low flush toilets or grey water recycling be incorporated into the scheme?			✓
Climate change adaptation			
• Will soft landscaping and permeable surfaces be used instead of hard surfacing?	✓	✓	
• Will sustainable urban drainage systems be incorporated. If not why not?	✓	✓	
• Will rainwater harvesting measures be included in the scheme?			✓

Topic	Outline	Full/reserved matters	Aspirational
Energy			
• Will the scheme include provision of low or zero carbon energy technologies for example, solar panels or ground source heat pumps, provide details of the type and location and energy yield?			✓

Glossary

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.

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.).

Building for a Healthy Life: a tool for assessing the design quality of homes and neighbourhoods in England, comprising 20 criteria, to assess the design quality of new housing developments.

Building Regulations: building regulations in the United Kingdom are statutory instruments or statutory regulations that seek to ensure that the policies set out in the relevant legislation are carried out. Building regulations set out required standards for building work and materials and Building Regulations approval is required for most building work in the UK. Part L sets standards for the energy performance of new and existing buildings.

Carbon Neutral - is a building with zero net energy consumption, meaning the total amount of energy used by the building on an annual basis is roughly equal to the amount of renewable energy created on the site, or by renewable energy sources elsewhere. These buildings consequently contribute less overall greenhouse gas to the atmosphere than similar buildings. They do at times consume non-renewable energy and produce greenhouse gases, but at other times reduce energy consumption and greenhouse gas production elsewhere by the same amount.

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: long-term changes in temperature, precipitation, wind and all other aspects of earth's climate. It is often regarded as a result of human activity and fossil fuel consumption.

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.

Green and Blue Infrastructure: a network of multi-functional greenspace, water resources, urban and rural which is capable of delivering a wide range of

environmental and quality of life benefits and can include parks, open spaces, playing fields, woodlands, wetlands, grasslands, river and canal corridors, allotments and private gardens.

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 vapour, carbon dioxide, and methane.

Infrastructure: facilities and services to meet the needs of the existing community and to meet the needs of new development. Includes transport infrastructure, public transport, education, health, affordable housing, open space, community facilities etc.

International Inter governmental commission on climate change: is the leading international body for the assessment of climate change, and a source of scientific information and technical guidance for Parties to the United Nations Framework Convention on Climate Change (UNFCCC), its Kyoto Protocol and Paris Agreement. The IPCC prepares comprehensive Assessment Reports about knowledge on climate change, its causes, potential impacts and response options. The fifth Assessment was published in 2014 and the Sixth is anticipated in 2022.

National Planning Policy Framework (NPPF): document setting out the Government's planning policies for England and how these are expected to be applied.

Sustainable development: The NPPF defines this as follows: "at a very high level, the objective of sustainable development can be summarised as meeting the needs of the present without compromising the ability of future generations to meet their own needs".

Renewable energy: includes energy for heating and cooling as well as generating electricity. Renewable energy covers those energy flows that occur naturally and repeatedly in the environment – from the wind, the fall of water, the movement of the oceans, from the sun and from biomass and ground heat.

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.