BARNSLEY Local Plan

Supplementary Planning Document

Sustainable Construction and Climate Change Adaptation

Adopted July 2023

BARNSLEY
Metropolitan Borough Council

Sustainable Construction and Climate Change Adaptation

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1. About this guidance

1.1 The National Planning Policy Framework (NPPF) indicates that Local Development Documents form the framework for making decisions on applications for planning permission. Decisions have to be taken in accordance with the development plan unless other material considerations indicate otherwise. NPPF advises that a local planning authority may prepare Supplementary Planning Documents to provide greater detail on the policies in its Local Plan. Supplementary Planning Documents are a 'material' consideration when planning applications are decided.

1.2 As required by the Planning and Compulsory Purchase Act 2004 we have prepared a Statement of Community Involvement (SCI) which sets out how we will involve the community in preparing our Local Plan and consulting on planning applications. In accordance with the SCI we have involved people who may be interested in this Supplementary Planning Document and asked them for their comments. We have produced a consultation statement which summarises all the comments people made to us and our response. This is available on request.

2. Introduction

2.1 This Supplementary Planning Document sets out our approach to planning decisions in respect of sustainable construction and adapting to climate change. It sets out what the requirements for development are based on our existing Local Plan policies, existing planning practice guidance and national requirements. It also sets out where we would welcome and encourage higher standards and includes information and links to technical guidance. The Council is not responsible for the accuracy of and updates to the information provided in the external links, they are provided as supporting technical material.

2.2 The Climate Change Act 2008 (2050 Target Amendment) Order 2019 (CCA) sets a net zero emissions target for 2050. The reference point for this target is at least 100% below 1990 emission levels.

2.3 The NPPF 2021 recognises the key role planning has in meeting the challenge of climate change and states that local planning authorities should adopt proactive strategies to mitigate and adapt to climate change. It 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. Para 8 includes the 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*.' 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*.'

2.4 Section 19 of the Local Plan sets out how the Council will attempt to address the climate change issues through a range of policies.

2.5 The Council declared a climate emergency in September 2019. To help Barnsley reduce its carbon emissions the Council has two programmes:

i. Zero 40 which will focus on improvements in the Council's performance, working towards being net zero carbon by 2040
ii. Zero 45 where the Council will help the whole of Barnsley, including residents, communities, partners and businesses to become net zero carbon by 2045.

2.6 The Council's Sustainable Energy Action Plan (SEAP) sets out a range of measures to achieve net zero by 2030 and 2045. The Plan is progressive and will be superseded by new strategies supported by other documents such as the Zero 45 Route Map and Affordable Warmth Charter. This SPD advises on the range of measures to reduce carbon and resources in major residential, commercial and other development proposals, in accordance with the current SEAP and any future iterations.

2.7 The Climate Change Committee (CCC) May 2019 report [1] includes information about the effects of greenhouse gases and provides a definition of what is meant by Carbon Emissions: "Long-lived greenhouse gases like carbon dioxide accumulate in the atmosphere. Therefore, their emissions must be reduced to zero in order to stop their cumulative warming effect from increasing and to stabilise global temperatures. Some activities, such as afforestation actively remove CO2 from the atmosphere.

2.8 The Affordable Warmth Charter supports the Governments strategy "Sustainable Warmth: Protecting Vulnerable Households in England" Feb 2021. It sets out the priorities of the Council and its partners to tackle the challenges faced by many households in heating their home. The collective priorities of the Affordable Warmth Charter are: energy efficient homes; affordable energy; employment, education and skills; partnership working and low carbon commitments. Insulation, energy reduction, decarbonising electricity and retrofitting wherever possible will contribute to the prevention of people living in cold homes and excess winter deaths.

3. Policy

3.1 This guidance supplements the following Local Plan policies:

Policy SD1 Presumption in favour of Sustainable Development

When considering development proposals we will take a positive approach that reflects the presumption in favour of sustainable development contained in the National Planning Policy Framework. We will work proactively with applicants jointly to find solutions which mean that proposals can be approved wherever possible, and to secure development that improves the economic, social and environmental conditions in the area.

[1] Net Zero Technical Report. Committee on Climate Change, May 2019. P.4

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Policy CC1 Climate Change

We will seek to reduce the causes of and adapt to the future impacts of climate change by:

- Giving preference to development of previously developed land in sustainable locations;
- Promoting the reduction of greenhouse gas emissions through sustainable design and construction techniques;
- Locating and designing development to reduce the risk of flooding;
- Promoting the use of Sustainable Drainage Systems (SuDS);
- Promoting and supporting the delivery of renewable and low carbon energy; and
- Promoting investment in Green Infrastructure to promote and encourage biodiversity gain.

Policy CC2 Sustainable Design and Construction

Development will be expected to minimise resource and energy consumption through the inclusion of sustainable design and construction features, where this is technically feasible and viable.

All non-residential development will be expected, to achieve a minimum standard of BREEAM ‘Very Good’ (or any future national equivalent). This should be supported by preliminary assessments at planning application stage.

Policy CC3 Flood Risk

The extent and impact of flooding will be reduced by:

- Not permitting new development where it would be at an unacceptable risk of flooding from any sources of flooding, or would give rise to flooding elsewhere;
- Ensuring that in the Functional Floodplain (Flood Zone 3b), only water compatible development or essential infrastructure (subject to the flood risk exception test) will be allowed. In either case it must be demonstrated that there would not be a harmful effect on the ability of this land to store floodwater;
- Requiring developers with proposals in Flood Zones 2 and 3 to provide evidence of the sequential test and exception test where appropriate;
- Requiring site-specific Flood Risk Assessments (FRAs) for proposals over 1 hectare in Flood Zone 1 and all proposals in Flood Zones 2 and 3;
- Expecting proposals over 1000 m2 floor space or 0.4 hectares in Flood Zone 1 to demonstrate how the proposal will make a positive contribution to reducing or managing flood risk; and
- Expecting all development proposals on brownfield sites to reduce surface water run-off by at least 30% and development on greenfield sites to maintain or reduce existing run-off rates requiring development proposals to use Sustainable Drainage Systems (SuDS) in accordance with policy CC4; and
- Using flood resilient design in areas of high flood risk.

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Policy CC4 Sustainable Drainage Systems (SuDS)

All major development[2] will be expected to use Sustainable Drainage Systems (SuDS) to manage surface water drainage, unless it can be demonstrated that all types of SuDS are inappropriate.

The Council will also promote the use of SuDS on minor development.
To enable the Council to determine the suitability of a proposed SuDS scheme:

- Outline Planning applications must be supported by a conceptual drainage plan and SuDS design statement; and

- Detailed Planning applications must be supported by a detailed drainage plan and SuDS design statement, which should contain information on how the SuDS will operate, be managed and maintained for the lifetime of the development.

Policy CC5 Water Resource Management

To conserve and enhance the Boroughs water resources proposals will be supported which:

a. Do not result in the deterioration of water courses and which conserve and enhance:

    i. The natural geomorphology of water courses;
    ii. Water quality; and
    iii. The ecological value of the water environment, including watercourse corridors.

b. Make positive progress towards achieving "good" status or potential under the Water Framework Directive in the boroughs surface and ground water bodies;
c. Manage water demand and improve water efficiency through appropriate water conservation techniques including rainwater harvesting and grey-water recycling; and
d. Dispose of surface water appropriately and improve water quality through the incorporation of SuDS, in accordance with Policy CC4.

[2] as defined in Article 2(1) of the Town and Country Planning (Development Management Procedure) (England) Order 2015 and subsequent updates

Policy RE1 Low Carbon and Renewable Energy

All developments will be expected to seek to incorporate initially appropriate design measures, and thereafter decentralised, renewable, or low carbon energy sources in order to reduce carbon dioxide emissions and should at least achieve the appropriate carbon compliance targets as defined in the Building Regulations.

We will allow development that produces renewable energy as long as there is no material harm upon:

- The character of the landscape and appearance of the area;
- Living conditions;
- Biodiversity, Geodiversity, and water quality;
- Heritage assets, their settings and cultural features and areas;
- Key views of, from or to scenic landmarks or landscape features;
- Highway safety, or
- Infrastructure including radar.

In assessing effect, we will consider appropriate mitigation which could reduce harm to an acceptable level.

Proposals will be expected to include information regarding their efficiency.

Proposals must be accompanied by information that shows how the local environment will be protected, and that the site will be restored when production ends.

4. Whole Life Carbon

4.1 Whole life carbon emissions relate to the carbon emissions associated with a building over its entire lifetime arising from materials, its construction, and its use. Traditionally it has mainly been operational emissions that have been assessed. The RICS whole life carbon assessment for the built environment document November 2017 states that "*A whole life carbon approach identifies the overall best combined opportunities for reducing lifetime emissions, and also helps to avoid any unintended consequences of focusing on operational emissions alone. For example, the embodied carbon burden of installing triple glazing rather than double can be greater than the operational benefit resulting from the additional pane. Therefore, whole life carbon needs to be effectively integrated into the sustainability agenda in order to achieve a lower carbon future.*"

A whole life carbon assessment will be required with full or hybrid applications or assessment of approval of reserved matters for major developments (10 dwellings or above and 1000m^2 or above for commercial developments or change of use developments). Where we receive an outline application, if minded to approve, a condition will be added requiring submission of a Whole life carbon assessment alongside the reserved matters. The whole life carbon assessment will be expected to follow the model set out in the RICS professional statement 'Whole Life Carbon Assessment for the Built Environment, 2017", or, if applicable, the latest subsequent version of this document or other recognised document setting out best practice for whole life carbon assessment. which RICS members must act in accordance with. https://www.rics.org/globalassets/rics-website/media/news/whole-life-carbon-assessment-for-the--built-environment-november-2017.pdf

4.2 The professional statement mandates a whole life approach to reducing carbon emissions and sets out specific mandatory principles and supporting guidance for the interpretation and implementation of European standard EN 15978 methodology, which is the European standard that specifies the calculation method, based on life cycle assessment and other quantified environmental information, to assess the environmental performance of a building, and gives the means for the reporting and communication of the outcome of the assessment.

4.3 Paragraph 3.1 of the RICS Professional Statement states that "*Whole life carbon assessments should be undertaken in a sequential fashion during the design, construction, and post-completion stages, starting as early as at concept design stage (RIBA stage 2 or equivalent………As a minimum a whole life carbon assessment must be carried out before the commencement of the technical design (RIBA stage 4 or equivalent) of the project*"

4.4 Appendix 1 provides the flowchart from the RICS document which sets out the recommended sequence of activities to complete an assessment.

4.5 The RICS Building Carbon Database reinforces the RICS professional statement and may be helpful in identifying where associated carbon emission reductions can be made during all stages of a buildings lifecycle. For organisations that submit their data, this database is free to use. Registration to access the database is available here: https://wlcarbon.rics.org/Default.aspx

5. BREEAM Certification for Non-Residential Buildings

5.1 BREEAM is an internationally recognised way of assessing the sustainability of masterplanning projects, infrastructure, and buildings. It has six ratings that can be awarded:

- Outstanding
- Excellent
- Very Good
- Good
- Pass
- Unclassified

5.2 To grade a development a BREEAM assessor will consider its designed performance across a number of different topics, which include subjects such as energy, pollution, and waste. In each topic there are different targets, and meeting the targets leads to 'credits' being awarded. Local Plan Policy CC2 Sustainable Construction requires all non-residential development to achieve a minimum BREEAM standard of 'very good'. Higher BREEAM standards are welcomed and encouraged where possible. Proposals should be supported by preliminary BREEAM assessments at planning application stage.

6. Future Homes Standard

6.1 The Government has brought in the Future Homes Standard, which from 2025 will require CO2 emissions produced by new homes to be 75-80% lower than homes that are built to current standards. Homes will need to be zero carbon ready with no retrofit work required to benefit from the decarbonisation of the electricity grid and the electrification of heating. The intention is to future proof new homes for low carbon heating systems and meet higher standards of energy efficiency.

6.2 The Government has also 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).

6.3 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.

6.4 We expect new development to adhere to relevant Building Regulations standards (and any future updates of these), as a minimum. We welcome and encourage higher standards where possible.

7. Energy Efficiency and Adaptation

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

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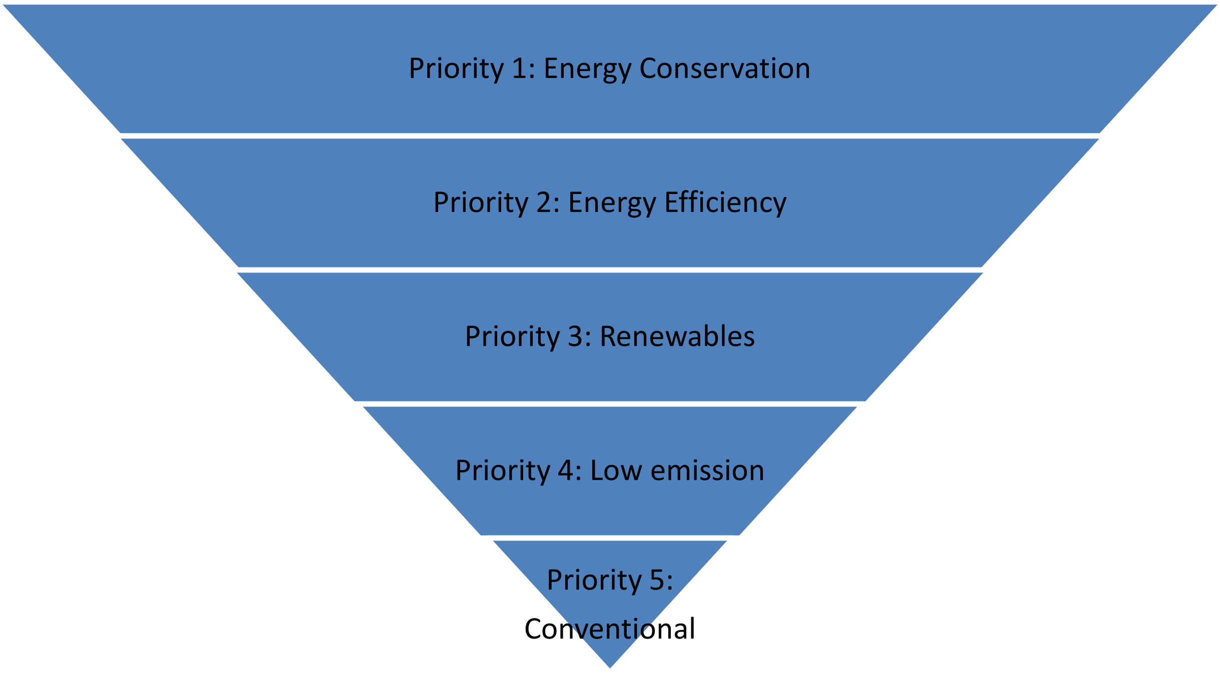
producing technologies like solar and wind, while reducing the overall use of energy with highly efficient lighting technologies. The zero-energy goal is becoming more practical as the costs of alternative energy technologies decrease and the costs of traditional fossil fuels increase. The development 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.



7.4 The ‘energy hierarchy’ is a recognised approach to reducing the CO_2 emissions from new development (see above). 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 12 from renewable carbon sources can contribute to further CO_2 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.

7.6 An Energy/Sustainability Statement should demonstrate how the proposed development would minimise resource and energy consumption. The detail that should be provided in this statement is set out in the Local Validation Requirements. Link to be provided when updated version on website and available.

8. Sustainable Materials

8.1 This section covers materials used in both buildings and outdoor areas, including public and private realms. Selection and use of sustainable materials should balance a number of complementary/standalone/competing direct and indirect criteria:

A. Sustainable resource – Materials which do not unreasonably deplete non-renewable natural resources or threaten environmental systems are needed to mitigate climate change and its effects;

B. Low embodied energy, greenhouse gases, pollution, and water – This describes low net amounts of energy use, pollution including greenhouse gases (notably carbon), and water usage, relating to materials during their life cycle, though extraction, manufacture, transport, installation, maintenance, replacement and end of life. It should be noted, trees, straw and other plant-based materials uniquely store carbon (accumulated when living and until the material degrades/burns);

C. Efficient use – Avoiding excess use of materials and built footprint;

D. Minimised construction waste – Designs and construction processes which minimise waste (including ground material), with any waste sustainably reused or recycled where possible;

E. Passive climate, air and moisture control – Materials which contribute to an effective package of (i) thermal insulation and thermal mass, and (ii) air quality including (moisture) breathability; which minimises pollution, the need for mechanical systems and risk of moisture-related degradation;

F. Cool roofs – Roofs which are more solar reflective and heat emissive, to avoid excessive heat absorption, overheating of buildings and in turn the creation of urban heat islands. [ref: The Global Cool Cities Alliance (January 2012), A Practical Guide to Cool Roofs and Cool Pavements – https://globalcoolcities.org/wp-content/uploads/2021/07/CoolRoofToolkit_ImplementationGuide.pdf];

G. Robust materials and sustainable maintenance – Materials which can be easily maintained, replaced (including through long-term availability) and adapted, without the need for unsustainable maintenance or excessive replacement;

H. Reusable and recyclable – Materials which can be easily and sustainably extracted, reused, and recycled, to reduce demand for raw material, waste and pollution derived from demolition/extraction;

I. Inert and biodegradable – Materials which if spilt, shed, abandoned, or forming waste will not have an adverse impact on the environment or require unsustainable treatment processes;

J. Timeless quality and character – Materials which have a timeless and locally responsive use and sensory appeal, which people are less likely to replace or cover over as times change; and

K. Cost, buildability, performance, and availability – next best sustainable solutions will be sought, if, evidently, the above sustainable materials criteria cannot be reasonably met due to viability, buildability and in use performance issues, and the issue can't be designed-out.

8.2 These criteria strongly point toward local natural materials being the best options, including:

- clay stock bricks (gault and soft red), tiles and pavers;
- native timber framing, weatherboarding, shingles, edging, boarding, and fencing;
- lime render, plaster, and mortar;
- limewash wall coating;
- straw/reed/flax roofs and insulation;
- earth walls such as cob, and in wattle and daub;
- flint walls and paths; and
- local gravel/hoggin tracks and paths.

8.3 Use of these natural materials is to be preferred where appropriate, subject to detailed specification, sustainable sourcing, context, and appropriate design. Other materials that are also favoured are those benefiting from appropriately recognised sustainability certification/endorsement, such as following the BRE's Environmental Profiles Methodology and Life Cycle Assessment – https://globalcoolcities.org/wp-content/uploads/2021/07/CoolRoofToolkit_ImplementationGuide.pdf , subject to satisfying the above Timeless Quality and Character criteria.

8.4 The Council strongly recommends that materials should be specified from suppliers who participate in an applicable responsible sourcing scheme such as the BRE BES 6001:2008 Responsible Sourcing Standard. For example, all timber should be sourced from schemes supported by the Central Point of Expertise for Timber Procurement, such as Forest Stewardship Council (FSC) accreditation, which ensures that the harvest of timber and non-timber products maintains the forest's ecology and its long-term viability. Other materials will be judged on their own merit in relation to any given scheme on the information provided (or lack of it), informed by latest technologies, current national policy, and recognised research. Fake (and obviously inferior) interpretations of natural facing materials should be avoided without compelling supporting evidence. These materials include plastic (except possibly for utilities, sports pitches and facing wood composite windows), fibre-cement timber-effect cladding and slate-effect tiles, and concrete clay-effect bricks and tiles.

8.5 It is the developer's responsibility to consider materials selection early enough in the design process to ensure proposals are buildable and affordable. Paragraph 130 of the NPPF guards against the material diminution of the quality of approved development between permission and completion, for example through changes to the materials to be used.

8.6 Attention is drawn to further guidance on sustainable materials, such as:

- Green book live. Available online here - https://www.greenbooklive.com/; and

- RICS professional standards and guidance, UK. Whole life carbon assessment for the built environment, 1st edition, November 2017. Available online here - https://www.rics.org/globalassets/rics-website/media/news/whole-life-carbon-assessment-for-the--built-environment-november-2017.pdf

9. Modern Methods of Construction

9.1 Modern methods of construction are focussed on enhancing products and processes. They aim to improve manufacture, delivery and construction efficiencies, quality, timescale, and performance. Typical methods include:

- panellised units produced in a factory and assembled on-site to produce a three-dimensional structure;
- volumetric construction to produce three-dimensional modular units in controlled factory conditions prior to transport to site; and
- floor or roof cassettes, pre-cast concrete foundation assemblies, pre-formed wiring looms, mechanical engineering composites and innovative techniques such as tunnel form or thin-joint block work.

9.2 Adopting a manufacturing process in construction has some potential advantages in terms of sustainability over traditional methods of construction:

- wastage can be more easily monitored and significantly minimised through the process of factory production, refinement, and repetition of processes;
- offsite manufacturing minimises the time (and energy) spent on site thereby minimising pollution and disruption at a site level;
- a significant reduction in HGV movement at construction sites for modular construction compared against traditional construction;
- workers are likely to be more geographically concentrated around a specific factory, minimising travel around the country;
- factory conditions can give greater quality control over construction, helping close the gap between design and as-built environmental performance;
- the regular testing of products can be carried out systematically, with improvements factored into the design process on an on-going basis.

9.3 Nevertheless, modern methods of construction are also often associated with some disadvantages. Potential issues include (significant) restrictions on design options, fixing the design earlier in the process, taking work away from local tradespeople and reducing the future adaptability of buildings.

Living Walls and Roofs

9.4 Living walls and roofs describe a range of sustainability measures relating to the external building envelope. Further information on living roofs and walls can be found in the Biodiversity SPD.

9.5 There are two distinct types of living walls – green ‘walls’ with vertically applied growth medium, hydration and fertigation, and green ‘facades’ which rely on climbing plants growing up from ground level.

9.6 Living roofs come in various guises. Green roofs are predominantly or completely covered with vegetation, under which is growing medium and a waterproof membrane. Intensive green roofs are specifically designed for recreational amenity such as gardens and sports pitches. Brown roofs are similar to green roofs, the main difference being the choice of growing material (usually locally sourced rubble, gravel, soil etc. similar to brownfield sites), which is typically self-seeded, leading to a different type of biodiversity and more informal outlook. Blue roofs are designed to explicitly store and gradually release or reuse water (rainwater and/or greywater), through active or passive processes which might be enclosed or openly visible. Lastly, there are predominantly hard surfaced roof gardens and terraces, which rely on contained beds or pots for planting.

9.7 The principal potential benefits of living roofs and walls which developers should consider are:

- improved energy balance - greenhouse gases are reduced as vegetation stores carbon and improves thermal properties (and in-use costs) through insulation and the cooling effects of evapotranspiration;
- outdoor amenity - accessible roof space can contribute to outdoor recreational amenity, with the option to drive a more compact (sustainable) pattern of development without compromising liveability standards;
- food production – growing vegetables and herbs, e.g., rooftop farms and allotments on large buildings, and pots and edible walls relating to individual properties;
- ecology – increased ecology and biodiversity;
- SuDs – living roofs and to a lesser degree living walls, can store and slow down the passage of rainwater to help prevent flooding, with potential usage including water treatment, rainwater harvesting, greywater recycling, ecology, and recreational amenity; and
- enhanced visual impact – living greenery can help buildings settle into the landscape and relieve urban settings, including from upper storey windows.

9.8 Living roofs and walls also provide some potential challenges in addition to those associated with flat roofs. They are heavier and increase the use of contentious materials such as plastics needed to prevent water and root egress. They also require increased maintenance.

9.9 The Council considers that the following should apply to all new developments:

- Living roofs of a suitable type and design should be considered on all new roofs of more than 25m^2 , which are flat or have a pitch of less than 25 degrees, should be a suitable type and design of living roof, unless conflicting with openings to provide natural light and the rooftop provision of solar panels; and
- living walls should be considered as a possible option on buildings, though especially if needed to help mitigate visual impact on otherwise unacceptably blank and/or architecturally unrelieved façades.

If there is conflict between provision of photovoltaics and living roofs, we will prioritise photovoltaics.

Photovoltaics (PV)

9.10 PV converts light into electricity. Panels are normally on the roof but can also be on the ground or wall mounted. Roof integrated (rather than attached) systems can mimic traditional tiles which may be required in sensitive locations. The production of PV panels is energy intensive and involves some pollutants. However, they generate no in-use pollution and are low maintenance. Perovskite solar panels are more lightweight, powerful, and affordable than silicon, and come in a variety of colours. Energy output is dependent on favourable positioning (e.g., south facing roof) and weather, with most systems connected to the grid to mitigate shortages and at night. Alternatively, battery storage offers increased energy independence. PV installation costs are still quite high, though this can be recovered through energy cost savings and feed-in-tariffs. Where possible, large discreet rooftops such as flat roofs or adorning industrial type 'sheds' should be used as rooftop solar farms actively feeding into district systems and/or the national grid.

Solar Water Heating

9.11 Solar water heating systems uses clean and direct energy from the sun to provide hot water supplies. A supplementary hot water supply will be required when solar energy is insufficient, for example when it's too cloudy, during winter months and to increase water temperatures. Water heating is not provided at night, though hot water can supplied by the required storage tank.

Small and Micro Wind Turbines

9.12 The UK has the biggest potential for wind power in the world. Small and micro wind turbines generate electricity the same as their larger equivalents, by using windblown rotating blades to drive a turbine. Small wind turbine blades are typically 1.5-3.5m in diameter and able to generate 1-10KW. These tend to be free-standing or on large buildings away from sensitive receptors. With their smaller blades and more disproportionately limited capacity, micro wind turbines are better suited to urban, suburban, and sensitive locations, though normally only supplement energy supply even on windy days. The size, siting and design of wind turbines needs to suitably address other issues, such as visual impact, noise, and vibration.

Ground Source Heat Pump (GSHP)

9.13 A GSHP is a central heating and/or cooling system which uses looped piped liquid (water mixed with anti-freeze) in the ground to transfer ground heat to or from a building via an exchanger and pump to amplify conversion. Pipes might be sunk horizontally (a metre or so beneath the ground). Where there is insufficient space, vertical boreholes can instead be drilled to extract heat from much further down, typically 90-160m deep. GSHPs take advantage of the earth's geothermal properties which absorbs and stores heat resulting in constant moderate temperatures similar to average yearly outside air temperatures. GSHPs use electricity but generally have a low environment impact.

Water Source Heat Pump

9.14 This operates similar to GSHP, except it utilises relatively consistent temperatures found in suitable bodies of water, such as a rivers, streams, or lakes.

Air Source Heat Pump

9.15 An air source heat pump transfers heat energy between the inside and outside of a building to provide heating and cooling. It uses a refrigerant system involving a compressor and a condenser to absorb heat energy at one place and release and concentrate the energy at another. They are generally cheaper than GSHPs, but typically generate less energy and can affect the external appearance of a building.

Biomass Heating

9.16 Biomass systems burn wood, plants, or other organic matter in the form of pellets, chips, logs etc. to provide warmth in a single room or to power central heating and hot water boilers. It is considered a renewable energy and low carbon option, given it can utilise waste material and there is scope for replacement tree planting (carbon storage) to mitigate carbon emissions from burning. Biomass systems produce pollutants including nitrogen dioxide, particles, and sulphur dioxide, which are more than for an equivalent gas boiler, though less than for a coal or oil powered boiler.

Micro Hydroelectric Power

9.17 This typically produces 5-100kW of electricity using the natural flow of water from a river or stream, perhaps focussed on a waterfall to maximise flow pressure. Micro systems can provide power to an isolated home or small community. It is considered a green, renewable energy and doesn't release carbon dioxide or other pollutants into the air. There will be impacts on aquatic ecosystems and particularly if the hydroelectric system involves damming.

Thermal Stores

9.18 Thermal stores complement renewable energy technologies by storing excess generated thermal energy for hours, days or even seasons until it's required. Technologies vary depending on the form of renewable energy technology. Potential storage media include water or ice-slush tanks, masses of native earth or bedrock, deep aquifers, insulated gravel and water filled pits, eutectic solutions, and phase-change materials.

Micro Combined Heat and Power

9.19 Combined heat and power (CHP) are a highly efficient technology, capturing and utilising the heat that is a by-product of the electricity generation process, reducing carbon emissions compared to separated generation via a boiler and power station. It might provide for a single family home, small community, or office building. Micro-CHPs currently tend to use fossil fuels such as gas and LPG, though the use of renewable energy supplies is growing, such as biomass, vegetable oil, wood gas and even solar thermal.

District Heating and Cooling

9.20 District heating systems distribute heat from a centralised source through insulated pipes to multiple residential and/or commercial properties. This centralised heat source can be generated from renewables including biomass, solar and geothermal. District heating systems can provide increased efficiencies and improved pollution control compared to single property systems. Metering is essential for fair billing and in turn control excess usage. Cooling is rarer in UK district systems, though might be considered particularly for groupings of new office buildings.

9.21 'The use of Heat networks will be supported where they are energy efficient and do not pose further environmental risks such as high embodied carbon supply chains or inefficient types of heat pumps'.

9.22 Examples of heat networks include a facility that provides a dedicated supply to the heat network, such as a combined heat and power plant; or heat recovered from industry (such as disused minewater), canals and rivers, or energy from waste plants.

- New development should minimise energy efficiency and space heating requirements, irrespective of district heat network connection
- Development should make all reasonable efforts to meet net zero onsite emissions prior to connection to any district heat network
- Where net zero cannot be met onsite, exemptions for district heat networks will be considered where there is a clear and demonstrable net zero transition plan to 2030.

Smart Technologies

9.23 Technology can help property users respond to and exploit natural processes to reduce the net need for energy, increase the effectiveness of renewable energy and enhance building performance. The scope of smart home technologies includes lighting, outlets and power strips, heating and ventilation, window coverings, water heating and home energy management systems. For example, heating and lighting controls in response to occupancy, mechanical brise-solei in response to sunlight, tracking solar panels and mechanical ventilation with heat recovery to complement a highly airtight design approach such as Passivhaus.

The Fabric First Approach

9.24 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.

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

- Maximising airtightness
- 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

9.26 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.

9.27 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

9.28 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.

9.29 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.

9.30 We would encourage Passive House design in all homes where possible. It is particularly encouraged in self build developments and any development within villages.

Future-proofing

9.31 Buildings need to be reasonably future-proofed to minimise maintenance and, as appropriate, facilitate extensions, alterations, repairs, and maintenance. For example, buildings should be future-proofed to connect/install new emerging technologies through appropriate cabling and easily accessible ducting.

9.32 The Covid-19 pandemic has helped to focus minds on how lives might change or adapt, and for how long. For instance, developers should consider (where space is available) how design and layout could cater for such things as subsequent periods of lockdown, increased homeworking, and the need to isolate individual family members.

10. Water Consumption and Flood Risk

10.1 The water (hydrological) cycle is the journey water takes from land to sea and back again.

1. Evaporation causes water vapour to be formed from water on land, in rivers, lakes and seas, which rises into the air.
2. Condensation from cooling forms clouds
3. Precipitation causes water to fall back to the ground as rain or snow and
4. Collection occurs as water reaches lakes or rivers, taking it back to the sea, restarting the cycle.

10.2 In relation to the water cycle, whilst the UK Water Industry continues 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.

10.3 All development should be designed to minimise the consumption of water and should make adequate and appropriate provision for water recycling. Development should also protect and enhance local water quality including measures to support improvement to a water body's Water Framework Directive Status.

10.4 Flood risk is an issue 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. Local Plan policies CC3 Flood Risk and CC4 Sustainable Drainage Systems (SuDS) should be considered in the design of development. 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. Support will be given to permeable surfaces and real grass as opposed to artificial grass.

10.5 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 to flood risk. Mapping data is available from the following website: https://www.climatejust.org.uk/map

10.6 Developers are expected to check the Climate Just Map tool and it should be covered in Flood Risk Assessments. If the proposed site is within an area that is not currently designated within a flood zone, but which could be vulnerable in the future design measures should be incorporated to future proof the development (where feasible).

11. Drainage and Flood Risk

11.1 Development should embed sustainable waste management, recycling of grey water and wastewater mitigation. Development proposals should demonstrate, and adequate foul water treatment and disposal already exists or can be provided in time to serve the development.

11.2 Development should be designed to provide adequate protection against flood risk and embed sustainable water recycling, wastewater and waste management so as not to cause contamination of groundwater, particularly in recognised protection zones, of surface water or run-off to river catchments. Where there is the potential for contamination, effective safeguards should be put in place to prevent any deterioration in current standards. A maintenance plan will be required detailing who will be responsible for the maintenance of SuDs for the lifetime of the development.

11.3 The Design of Housing SPD also sets out the requirements for new housing development and that detailed technical drainage also be found on pages 155-161 of the current version of the South Yorkshire Residential Design Guide.

12. Recycling/Waste Provision

12.1 Construction and operational waste can have significant environmental impacts, not least on greenhouse gases contributing to climate change. The Council encourages waste minimisation, re-use, and recycling. All new development must be designed to accommodate the waste and recycling regimes in force, for example providing sufficient space for the full range of waste and recycling bins.

Construction Waste

12.2 In regard to construction waste, any sustainability statement that is submitted as part of a planning application should outline measures for reducing construction waste, and maximising reuse and recycling. For schemes following sustainability accreditation schemes such as BREEAM, reference can be made to credits being targeted under the waste section of the methodology. For major developments, Policy WCS7 of the Joint Waste Plan requires a Site Waste Management Plan for all development except minor planning applications. A waste management plan should include design and layouts that allow effective sorting and storing of recyclables and recycling and composting of waste and facilitate waste collection operations.

12.3 There are a range of methods that can be implemented to reduce construction waste, adopted from the WRAP principles, where possible, applicants should utilise the design process to reduce waste through considering the following:

- design for reuse and recovery;
- design for off-site construction;
- design for materials optimisation;
- design for waste efficient procurement; and
- design for deconstruction and flexibility.

Operational Waste

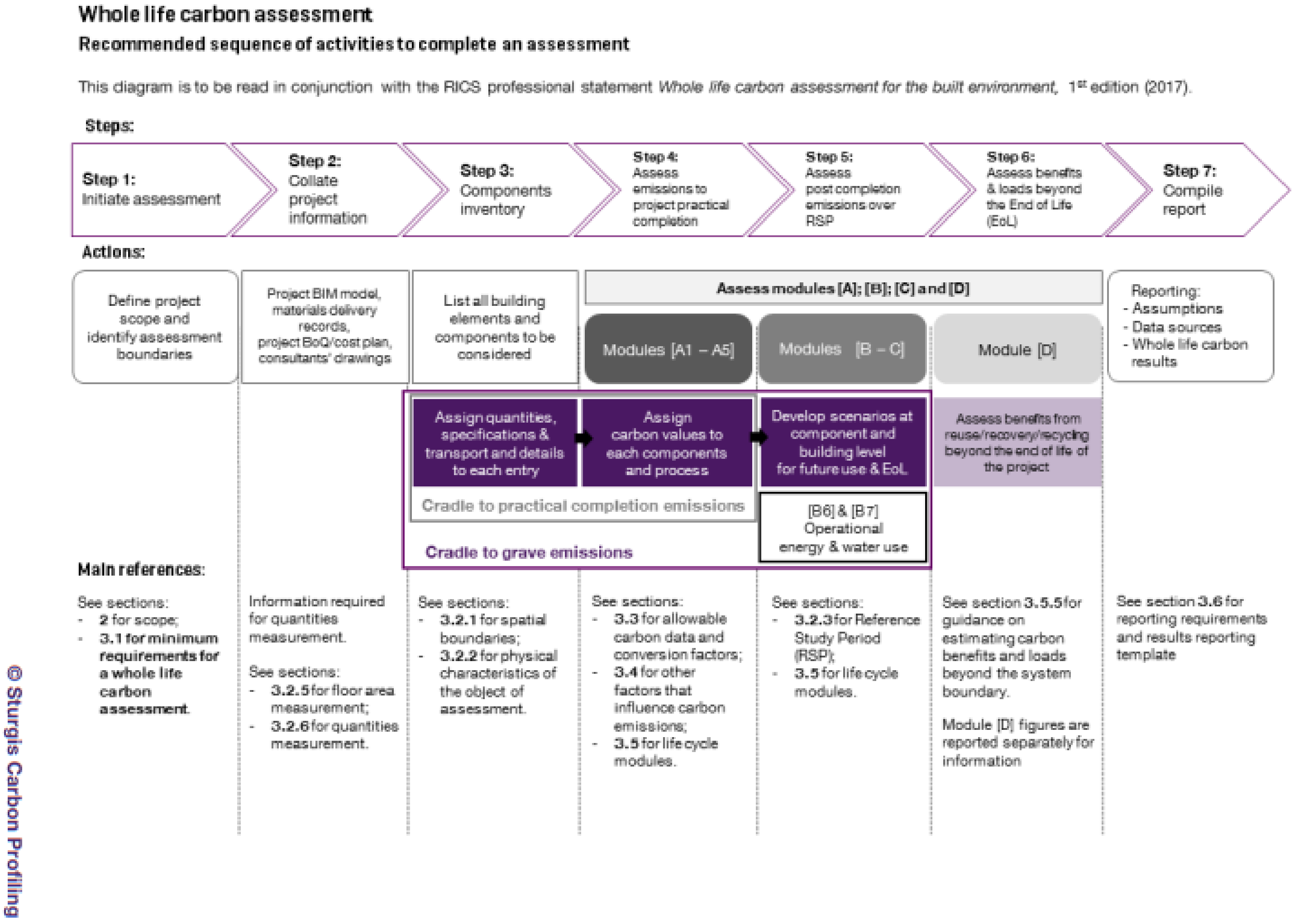
12.4 Local waste, recycling and collection arrangements for single houses or groups of houses need to be designed to facilitate reuse and recycling, without unreasonably dominating buildings, streets, and spaces.

12.5 To facilitate segregated household recycling, new homes should be fitted with separate appropriately sized and integrated bins, corresponding with the recycling and waste collection policy for the local area. At least three separate internal bins are required with a total capacity of at least 30 litres and each with a capacity of at least 7 litres. A compost bin is also required for any ground floor private garden of $50m^2$ or above.

13. Electric Vehicle Charging Points

13.1 Since the 15th June 2022 the requirements for provision of electric vehicle charging points has fallen under 'The Building Regulations 2010 Approved Document S Infrastructure for the charging of electric vehicles. The details can be found here:https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1057375/AD_S.pdf

14. Appendix 1



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