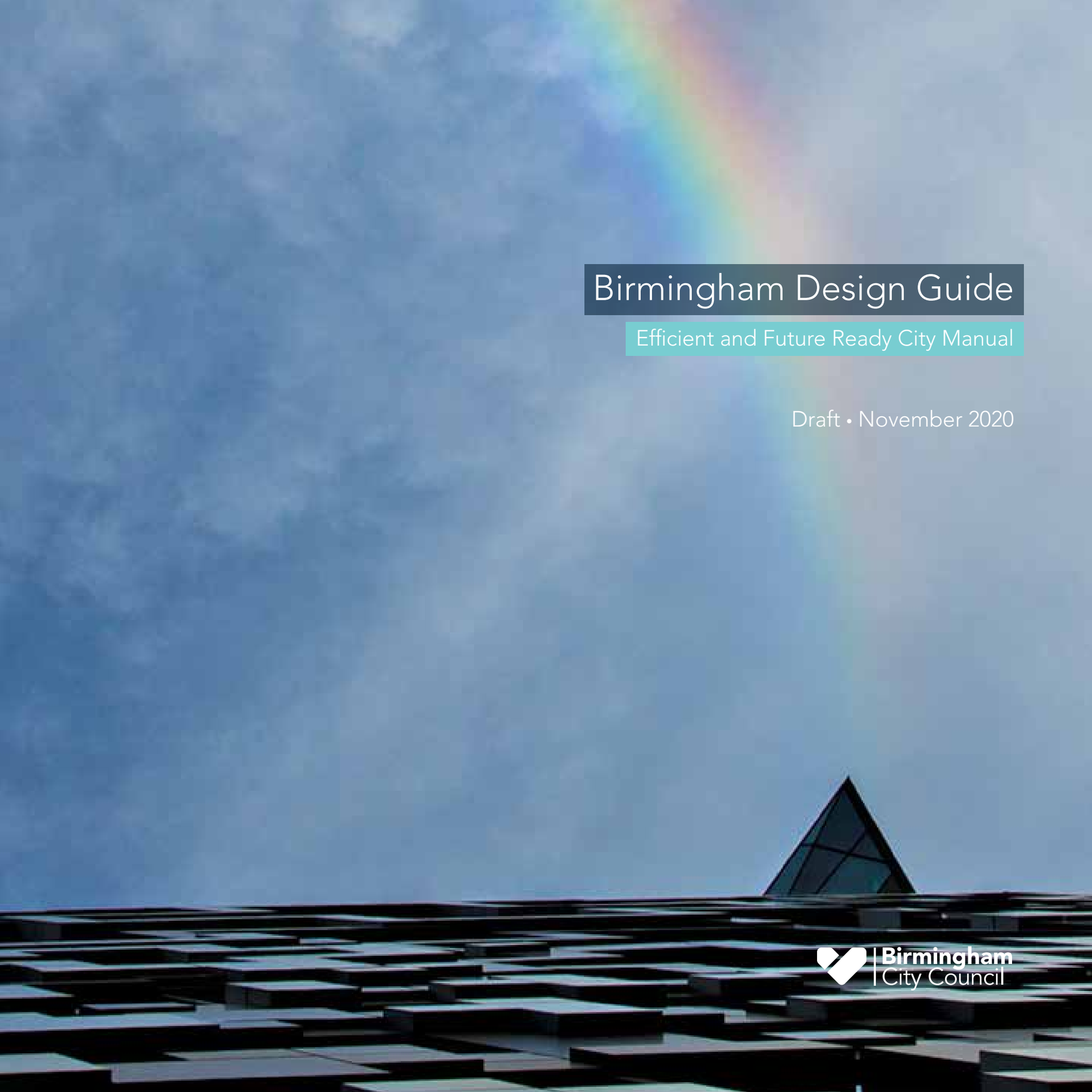

Birmingham Design Guide

Efficient and Future Ready City Manual

Draft • November 2020

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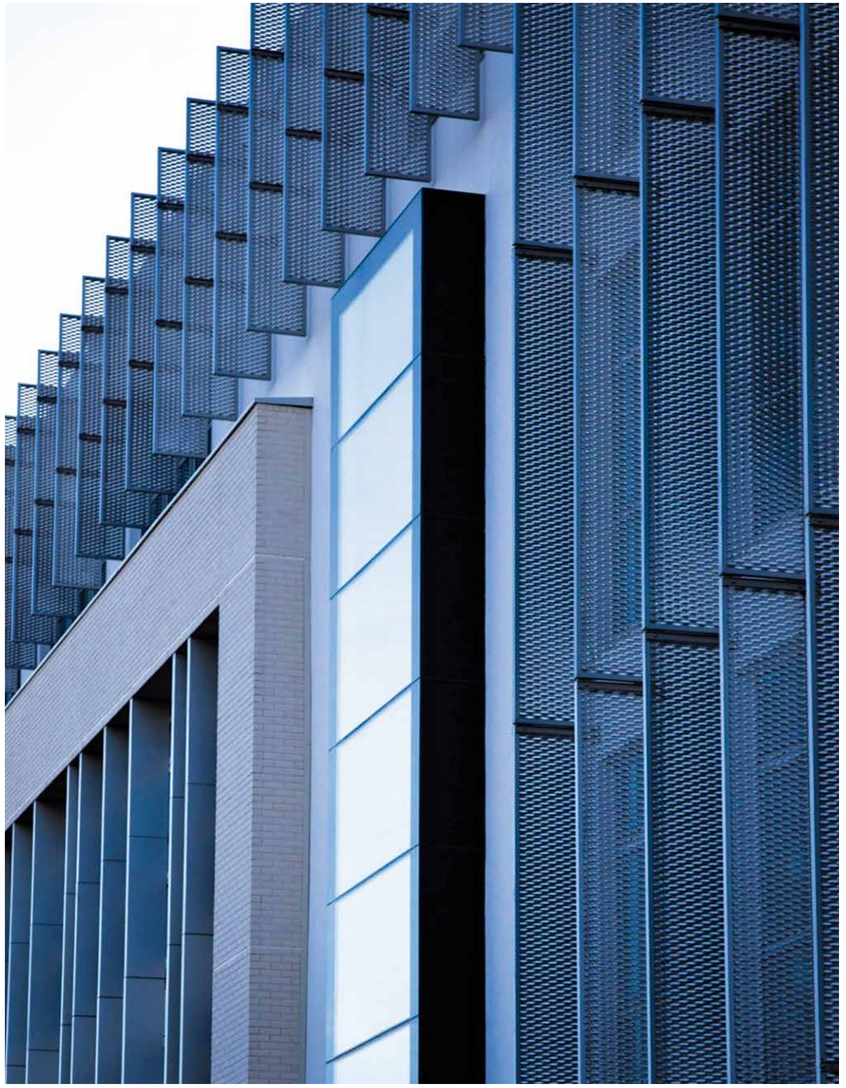

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Images by Tim Cornbill Photography, Simon Felton and Thomas Morris

Birmingham City Council

Contents

Creating future-aware development

CITY NOTE **EF-1**

Energy efficiency

Reducing the energy use of a building is one of the primary elements of achieving sustainable design, and should be a core goal for any development. While Building Regulations sets the minimum requirements development must achieve, the City Council encourages all developments to achieve gains above these requirements (as detailed in BDP Policy TP3 and associated guidance note); reducing carbon emissions, future-proofing the building and minimising the life-time energy costs for occupants.

The initial focus of designs should be to reduce the energy demands of a building; with the residual energy requirements provided by appropriate decentralised and/or renewable energy technologies.

Building technologies, infrastructure and products utilised by a design will play a primary role in creating these efficient buildings; but architects should also use the orientation, landscape and characteristics of the site to seek naturally sourced heating, light and shading.

Orientation and passive solar gain

The siting, design, layout and orientation of buildings can have a significant impact on energy consumption and the internal environment of the building. As a natural resource, architects should seek to positively use the climate to help reduce the energy burden of the building and enhance the internal environments created.

Harnessing the sun through passive solar design is a simple method of achieving these gains, creating naturally lit and heated space; in turn reducing the need for artificial light and heating. Keeping the main glazed areas of the building to within 30 degrees of south, will maximise the potential for the sun to heat the building and for natural daylight to penetrate the building.

Solar electricity infrastructure (photovoltaic tiles, cells, and panels) and solar thermal (water heating) installations also require this orientation. South-easterly orientation maximises early morning gains and reduces the likelihood of overheating in the afternoons.

A consequence of seeking heat and light from the sun will be the potential to overheat the building or space; requiring designs to incorporate features and/or measures to manage the levels of solar gain harnessed. Simple measures such as blinds or screens, and wider eaves will allow sunlight into rooms in winter when the sun is lower whilst providing shade in summer when the sun is higher. Consideration should also be given to providing ventilation to aid heat management and moisture prevention.

To help maximise the benefits of solar gain, internal layouts should be influenced by the buildings orientation and the associated solar gain (balanced with key urban design principles). The most frequently used rooms should be located on the south side of buildings to make best use of solar gain, whilst the north side should be used for less frequently used spaces such as bathrooms, circulation, building cores and storage that require less heating. Rooms sized to allow sunlight to hit the back wall will benefit from both the sun's natural heat and light.

Insulation and thermal mass

In order to efficiently use the passive heat gained by a considered orientation and layout, designs must use sufficient insulation and specify materials with a high thermal mass.

Enhanced insulation and draught-proofing will help prevent the loss of heat during winter months; and aid cooling during the summer. This in turn, will reduce the energy needed to heat and cool the building through the year. To further aid heat retention, designs should specify internal and external materials (in appropriate elements of the building) with a high thermal mass, allowing the building to absorb, store and release the passive heat gained; whilst aiding the moderation of internal temperatures. Conversely, during warmer months, this moderation helps with building cooling.

Dense materials, such as stone, brick and ceramic tiles have a high thermal mass, as do green roofs which provide a greater thermal mass than slate.

CITY NOTE **EF-2**

Conserving water resources and maximising water efficiency

Buildings should seek to reduce the amount of water used by occupants; and install infrastructure that enables grey water and rain water to be captured and used productively within the development. As with the building's energy consumption, managed water use will help reduce resource wastage (and the associated energy) and lower on-going water bills for occupants.

Grey water and/or rain water capture, has the potential to reduce the level of fresh water consumption. In residential and non-residential developments, the flushing of toilets accounts for a significant volume of water usage, which could be mitigated by utilising grey or rain water to flush the toilets. These secondary water resources could also be utilised to help irrigate surrounding landscape, clean vehicles and building elements, or used within an industrial process.

The capture of rain water, may also offer a reduction in the amount of water entering streams and surface drainage systems, contributing to SuDs and surface water flood management.

Coupled with grey and rain water capture, developers are also encouraged to specify water efficient appliances ('A' rated) and infrastructure that will further reduce the overall water use burden of the development.

CITY NOTE **EF-3**

Decentralised energy generation

As detailed within BDP Policy TP4, development must seek to install or connect to low or zero carbon energy infrastructure that can achieve long-term cost savings for the occupants; and carbon reduction gains for the city.

As suggested within BDP Policy TP4, the characteristics of the site and its surroundings will inform which methods of generation are viable for the development. Having established this early within the design process, proposals must effectively integrate the infrastructure into the architecture of the building/s.

Applied effectively, the infrastructure can be subsumed into the building's design; or used as an architectural feature that adds to the language and form of the outcome. Both approaches have merit in their outcomes, allied with a consideration of character and historic context; but proposals must not apply infrastructure as an afterthought or bolt-on that detracts from the architectural quality of the outcome.

Where a development is not proposing to connect to or install infrastructure, appropriate consideration needs to be given to how infrastructure could be connected or installed in the future. This should include:

- Installation or routing for appropriate ducting.
- Consideration of building orientation (as detailed above).
- Ensuring architectural elements such as roofs are of a design and form that could accommodate solar panels.

The Council's Guidance Note on Sustainable Construction and Energy Statements provides further guidance on the requirements of BDP Policy TP4 Low and Zero Carbon Energy Generation.

CITY NOTE **EF-4**

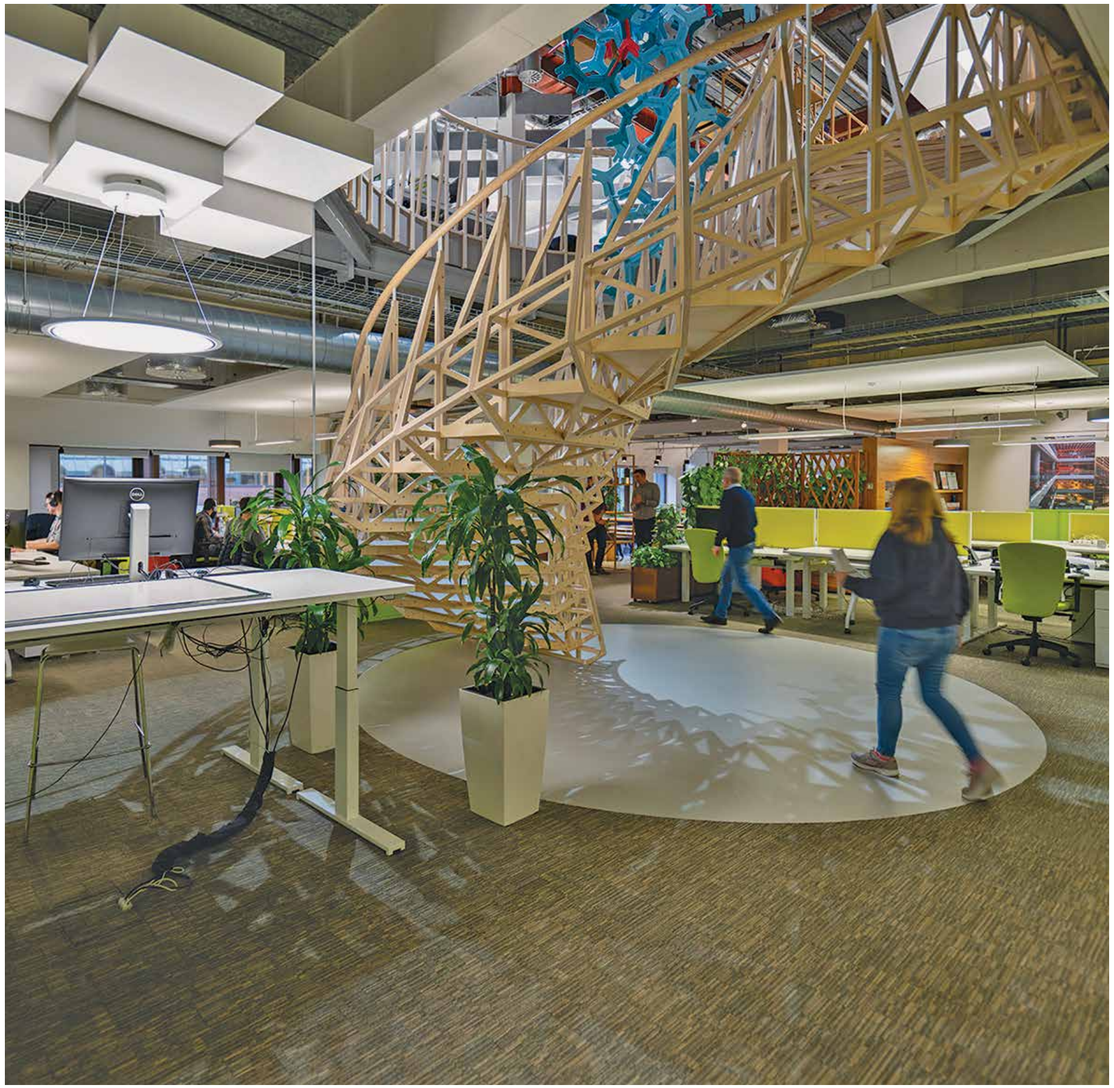
Flexible and adaptable building designs

It is important development across the city seeks to create buildings that have longevity; with the ability to adapt and change to altering needs, without major redevelopment.

A number of commercial developments (such as office, retail and industrial) are often designed to be flexible, providing spaces and units that have the ability to accommodate a wide range of uses; and be easily refurbished or internally modified as these uses change. This flexibility may also enable these buildings to accommodate a change of use, with relative ease.

In contrast, residential uses are rarely designed with the same level of adaptability, as their use is likely to remain residential for its lifetime. However, whilst the use may remain consistent, these buildings need to be able to adapt with their occupants. As lifestyles, personal circumstances and ways of living change, units need to be able respond to this; enabling internal layouts to be adjusted, supportive infrastructure to be installed and extensions to be added.

Homes built to Lifetime Homes Standards have flexibility built into their design, enabling easy adaptation to suit different requirements over time. This gives the building a longer lifespan, and may enable residents to remain in their home and community throughout their life; in turn potentially reducing a future burden on health and care services.



CITY NOTE **EF-5**

Building re-use and sustainable materials

Allied with the use of resources needed to run a building, the construction of new developments utilises a range of resources and energy, which developers and architects should seek to reduce through the use of sustainable building techniques, low carbon materials and re-using existing built fabric.

Modular/prefabrication

The offsite construction of buildings or elements of a building, can lead to a number of advantages in terms of building efficiencies and sustainability. Factory environment construction can enable elements to be constructed quicker; higher levels of quality control to be monitored/achieved; and health and safety risks to be reduced. With an efficient system, it can also result in less waste and lower tolerances in term of insulation and air tightness.

Use of low carbon materials

Proposals should seek to utilise low carbon materials across their project, from the building's construction material to the hard and soft elements of the landscaping. In seeking to achieve this, proposals must consider the source of the products being used, their associated transport burden and the sustainability of the product itself. Where possible, the City Council promotes the re-use of materials and those sourced and produced in the UK.

Sustainable materials are those which have a low environmental impact. Generally they are:

- Produced from a renewable resource or are re-used or recycled from a previous use.
- Sourced locally to cut down on transport costs and to support the local economy.
- Produced with minimum ecological damage and no exploitation of the workforce.
- Non-polluting and non-toxic in manufacture, use or disposal.

And/or:

- Have low embodied energy, i.e. they are unprocessed or use the minimum amount of energy possible in their production.

Building re-use

Where a site contains an existing building, the potential for this to be retained (in whole or part) should be appropriately considered by any development proposal. Scenarios must consider how the building could be refurbished and/or modified to successfully accommodate the new use sought.

Appropriately re-used, an existing building can be a more sustainable approach to development, reducing the amount of virgin resources needed to deliver the outcome desired.

CITY NOTE **EF-6**

Climate resilience

Proposals must be designed to take account of the local climate and the potential changes to it resulting from climate change. This should take into account the potential for hotter, drier summers, and warmer wetter autumn and winter periods. More frequent and more extreme storms including high winds and flash flooding are also predicted. This will impact on all forms of infrastructure including storm drains and sewers as well as the built environment in general. Given the longevity of the buildings being created today, it is crucial they accommodate (or have the ability to accommodate) relevant infrastructure; and are constructed with robust materials that can manage and withstand the more erratic and warmer climate predicted.

While the requirement for SuDs will help manage the potential for surface water flooding, design must also consider how the building itself with shed and manage water. This may include detailing and infrastructure such as: gutters and other rainwater goods of a size that can account increased and heavier rainfall; robust roof designs that incorporate detailing such as over-hanging eaves to cope with increased rainfall; and external walls protected from increased rain by large eaves and splash zones at their base.

CITY NOTE **EF-7**

BREEAM requirement

In line with Policy TP3 of the BDP (and the associated guidance note), all new non-residential built developments in excess of 1,000sq.m (gross permitted floorspace) or being developed on a site area of 0.5ha or more, must aim to meet BREEAM standard excellent (or any future national equivalent) unless it can be demonstrated that the cost of achieving this would make the development unviable. The standard applies to a range of non-residential development types including offices, schools, industrial, retail, but also applies to non C3 Residential Uses such as multi-residential and supported living developments. Requiring BREEAM certification helps to ensure that all new non-residential buildings incorporate a minimum standard of energy efficiency measures, energy generation and sustainable design characteristics into their development.

The Council's Guidance Note on Sustainable Construction and Energy Statements provides further guidance on the requirements of BDP Policy TP3 Sustainable Construction.

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