Supplementary Planning Document on

Climate Change Mitigation and Adaptation

London Borough of Hounslow

Contents

Chapter 1

Introduction

The United Nations has identified Climate Change as being the defining issue of our time and that we are now at a defining moment.

Failure to take sufficient action is expected to result in significant negative consequences for society – with, ultimately, "the collapse of our civilisations and the extinction of much of the natural world... on the horizon" (Sir David Attenborough – **UN Climate Change Conference 2018**).

In response, the **UK government** have declared a climate emergency highlighting the importance attached to tackling this issue.

On 18th June 2019, **Hounslow Council** also declared a 'climate emergency' and shortly thereafter announced a motion recognising the Government's legally binding national target to be zero carbon by 2050. To this end, it has called for "all possible ways to bring this target forward".

In line with this, we committed to identifying measures to reduce the Council's carbon footprint, making the Council's activities carbon neutral and ultimately carbon zero in the shortest possible timeframe. Subsequently, a **Climate Emergency Action Plan** was adopted on 14 July 2020 which identified the borough's route to carbon neutrality. Following this, and in response to the COVID 19 pandemic, the Council has also set out a **Green Recovery Strategy** which provides a framework for green recovery for the borough through the growth of sustainable industry and the green economy.

The **Committee on Climate Change** has estimated that 34% of carbon emissions within the UK can be attributed to buildings, with approximately half of that from heating buildings. The vast majority of buildings constructed today will exist in 2050, the date when the government aims to be zero carbon nationally. There is therefore a critical need to ensure that

every new building constructed today is carbon neutral

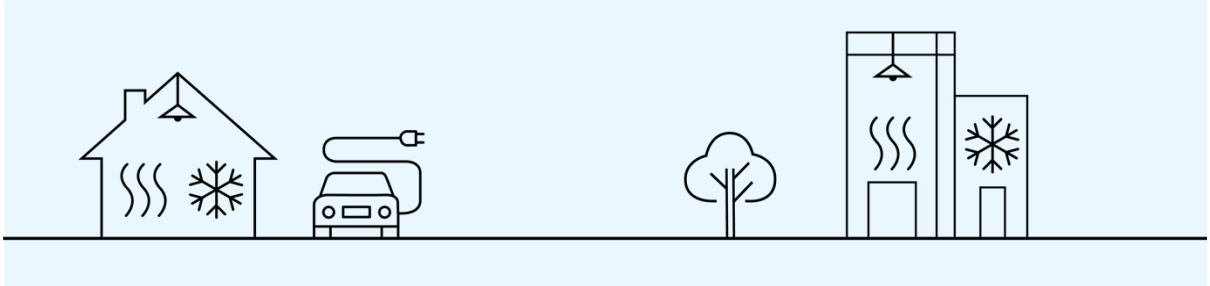
to avoid the need for wasteful and costly retrofit. Meanwhile, it is estimated by the **UKGBC** that approximately 80% of building stock that will exist in the UK in 2050 has already been constructed, highlighting the need to retrofit existing stock if we are to meet the 2050 target.

Planning, as a tool to shape the built environment, therefore has a vital role to play in meeting national, regional and local carbon reduction targets, such as those contained with the Council's Climate Emergency Action Plan and Green Recovery Strategy. This is a key driver for the inclusion of a short-term goal (2021–2025) in the Climate Emergency Action Plan, to prepare and adopt a Climate Change Supplementary Planning Document (SPD), which will provide additional guidance to adopted development plan policies which aim to reduce carbon emissions associated with development in the borough.

1.1 Purpose and scope of this document

The Council's Climate Emergency Action Plan sets out its intention to reduce its own direct emissions to net zero by 2030, and to use its influence and community leadership responsibilities to reduce wider borough emissions – which in 2019, government statistics show, amounted to 983 $ktCO_2$ – to net zero as quickly as is practicable after that.

The built environment is responsible for a significant proportion of these emissions – for example, around one third relates to domestic electricity, gas and other fuels, most of which are used for heating, lighting and other regulated uses. A further third of emissions relate to transport, which is heavily influenced by the design of the built environment. The final third relates to industrial and commercial uses, a significant amount of which will also be associated with the heating, lighting and cooling of buildings.



The Council's most direct sphere of influence over wider borough emissions relates, through planning policy, to those associated with new residential and commercial development. It therefore seeks to utilise the planning system to support the delivery of zero carbon new development as quickly as practicable. Other areas of influence relate to the promotion of sustainable transport – active travel, public transport and the transition of vehicular trips to electric mobility; and to delivering a greener borough which is more resilient to climate change.

1.1.1 Purpose

This document sets out guidance on how existing policies in the development plan should be implemented in order to deliver on the Climate Emergency Action Plan and support the journey to net zero; it does not contain any new policies, or original research or recommendations. Its intention is to support building owners and developers as they seek to address matters of climate change, be that through the design of new building schemes or through improvements to existing properties. It seeks to achieve this by:

1. Setting out practical guidance for a clear design and construction process for any new development, with the aim that, by 2030, all new buildings are able to operate at net zero carbon; and placing this guidance within the context of the wider sustainable design journey which developers need to follow, if they are to deliver sustainable buildings and places.

2. Clarifying existing local and regional policy requirements relating to both large and small development projects, while combating silo thinking – identified as being a key obstacle in

delivering an effective response to the climate emergency.

3. Providing a basis for clear and consistent decision-making for planning applications.

1.1.2 Scope and content

This document provides guidance for developers and designers proposing new housing or commercial schemes, or significant redevelopments/ refurbishments. It addresses both how developments should reduce emissions to combat climate change (mitigation), and also how they should adapt to the impacts of climate change, such as overheating. While it focuses specifically on building fabric and services, it also sets out how these fit into the wider sustainable design process which also includes site layout and form, green and blue infrastructure and public realm.

The guidance brings together and expands on relevant policies set out in the Development Plan (i.e., the London Plan, the Local Plan and related documents). Where relevant, it also references other sources of information from studies and professional publications. Wherever possible, this SPD refers back to existing documents where these adequately cover relevant issues, and will only include new guidance where this is needed. In developing this document, our officers have worked with other London boroughs and with London Councils, with the aim of delivering greater consistency across London.

This document takes as read the unequivocal scientific evidence for the human origins of climate change, and for the dire consequences to both the natural environment and human civilization that are likely to result from it. A planning application is not a forum for debating the seriousness of climate change and any suggestion that officers should disregard its importance when considering a planning application will carry no weight.

However, when defining the scope and content of this SPD it is important to note that the Development Management system is plan-led. There is a wide spectrum of views on how the challenge of climate change should be approached, but decisions on planning applications must be determined in accordance with the Development Plan unless material considerations indicate otherwise. When considering the planning balance, Council Officers will give significant positive weight to proposals that exceed existing policy requirements and targets. The Climate Change Emergency Action Plan commits the Council to review all its policies, including those in the Local Plan, to raise levels of ambition on climate action."

While certain types of application, such as Prior Approvals or variations to extant permissions cannot be required to meet these current targets, officers will use discussions with developers as part of the planning process to encourage compliance - e.g., by pointing out that it could be cheaper, and less disruptive to comply now with expected future requirements (such as tighter minimum energy efficiency standards for rental properties which may be introduced in the future).

It should be noted that this document is based on information, policies and regulations at the time of preparation (2022-23). The Council has not been responsible for the publication of this material, aside from its own policy documents. The weight afforded to the content of each source will vary. While the Council will endeavour to update this document over time, it is acknowledged that the source material may be superseded as and when new research is undertaken. You are advised to contact the Local Planning Authority for further information.

1.2 Planning policy and legislative framework

This section sets out the relevant national planning policy context, before outlining the key regional and local development plan documents and the relevant policies with which this SPD is primarily concerned.

1.2.1 International and national legislation

The international and national policy context and legislation on climate change, which may be relevant to planning decisions in London Borough of Hounslow, are set out in **Annex A**. The guidance contained within this document draws on this context and interprets it for development within the Borough. These policies will, where relevant and appropriate, be taken into account when considering planning applications.

1.2.2 National Planning Policy Framework

At the national level, the National Planning Policy Framework (NPPF) specifies the Government's planning policies for England and how these are expected to be implemented. The framework is underpinned by a presumption in favour of 'sustainable development', using the definition adopted by the UN: *"meeting the needs of the present without compromising the ability of future generations to meet their own needs".* The NPPF is a material consideration in all plan-making processes and development management decisions.

Paragraph 8 of the NPPF sets out the three overarching objectives for the planning system vis a vis achieving sustainable development: an economic objective, a social objective and an environmental objective. The environmental objective explicitly identifies the mitigation of and adaptation to climate change, including moving to a low carbon economy, as being central to meeting the Government's sustainable development ambitions. Annex 2 of the NPPF defines these goals as follows:

- Climate change mitigation: *"Action to reduce the impact of human activity on the climate system, primarily through reducing greenhouse gas emissions".*
- Climate change adaptation: *"Adjustments made to natural or human systems in response to the actual or anticipated impacts of climate change, to mitigate harm or exploit beneficial opportunities".*

The environmental objective also states that development should protect and enhance the natural, built and historic environment, including making effective use of land, as well as improving biodiversity, using natural resources prudently, and minimising waste and pollution.

Paragraph 9 of the NPPF states that these objectives should be delivered through the preparation and implementation of plans, and the application of the policies in the NPPF. Paragraph 10 establishes the presumption in favour of sustainable development, whilst paragraph 11 describes how the presumption should be applied to plan-making (including an explicit instruction that plans should promote a sustainable pattern of development which seeks to, *inter alia,* mitigate climate change and adapt to its effects) and decision taking.

The NPPF emphasises the invaluable role the planning system can play in cutting carbon emissions, minimising vulnerability, boosting resilience and supporting the delivery of a diversified energy system, where low carbon and renewable sources play an increasing role. To this end, Chapter 14 sets out policy to enable plan makers and decision takers to meet the challenge of climate change, flooding and coastal change. By way of introduction, paragraph 152 states:

"*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; encourage the reuse of existing resources, including conversion of existing buildings; and support renewable and low carbon energy and associated infrastructure*".

Further detailed and frequently updated national policy guidance is provided online through Planning Practice Guidance.

1.2.3 The London Plan

The London Plan is the spatial development strategy for Greater London, and as such forms part of the development plan for all London Boroughs. The current London Plan was published in March 2021. The majority of relevant policies are contained within Chapter 9 – Sustainable Infrastructure, but a range of other policies will also be relevant, as set out below. **The Key London Plan policies of relevance to this guidance are:**

Chapter 9:

- Policy SI1 Improving air quality
- Policy SI2 Minimising greenhouse gas emissions
- Policy SI3 Energy infrastructure
- Policy SI4 Managing heat risk
- Policy SI5 Water Infrastructure
- Policy SI7 Reducing waste and supporting the circular economy
- Policy SI12 Flood risk management
- Policy SI13 Sustainable drainage

Other related policies include:

Chapter 1:

- Policy GG6 Increasing efficiency and resilience

Chapter 3:

- Policy D3 Optimising site capacity through the design-led approach
- Policy D4 Delivering good design
- Policy D6 Housing quality and standards

For all new buildings, commercial or residential, the current policy requirement in the London Plan is for them to be net carbon neutral. In planning terms, carbon-neutral relates only to regulated energy uses - heating, cooling and lighting a property – but not to unregulated emissions (those from white goods and other plug-in items). For all applications referable to the Mayor of London, the lifetime carbon costs of a building - including those involved in its construction, i.e., its embodied carbon – are also to be assessed.

An important change from the previous London Plan is the call for a 'circular economy' (Policy SI7): *"one that produces no waste and pollution, by design or intention…[which] keeps products, parts and materials at their highest use and value at all times [and] offers a sustainable alternative to our current linear economy…A circular economy also uses fewer new resources and energy [which] means less cost to the environment"*. Central to meeting this policy ambition will be consideration, at the building design stage, of the efficient use of materials in its construction, as well as the accommodation of its future uses, refurbishment and eventual deconstruction and re-use of those materials.

1.2.4 Borough-level planning context

The Hounslow Local Plan (2015) Volume 1 is the key local development plan document (DPD) setting out the Council's strategic policies and proposals which are used to guide the development of the borough over a 15-year period to 2030. Local Plan policies must be consistent with national planning policy and conform with the Mayor of London's spatial development strategy, including policies related to sustainable development and climate change mitigation & adaptation.

This SPD provides additional practical and detailed guidance for Local Plan policies relating to climate change, to enable developers to enhance the sustainability of development in the Borough. The main Local Plan policies of relevance are in Volume 1, Chapter 9 – Environmental Quality, but policies in other chapters are also relevant. The key ones are set out below; however please note that this list is not intended to be exhaustive.

Chapter 6 – Context and Character:

- Policy CC2 – Urban design and architecture
- Policy CC4 – Heritage

Chapter 9 – Environmental Quality:

- **Policy EQ1 – Energy and carbon reduction**
- **Policy EQ2 – Sustainable design and construction**

Chapter 11 – Implementing the Strategy:

- Policy IMP1 – Sustainable development

Policies EQ1 and EQ2 are the most relevant to this document. They currently require all developments to meet the carbon emission reduction requirements set out in the London Plan, and to promote high standards of sustainable design and construction to be implemented. However, they also go further: in Hounslow, major developments are expected to connect to existing decentralized heating, cooling or power networks or be adaptable for future decentralized energy; they are also expected to evaluate the feasibility and viability of Combined Heat and Power systems (either onsite or beyond the boundary) and to make a financial contribution to a certified borough-wide carbon reductions programme where reductions cannot be reached onsite (see Chapter 3 for further details).

When embedding climate change mitigation and adaptation into new schemes, all development proposals are expected to incorporate established sustainable design and construction principles from the London Plan, successfully meet the latest assessment standards, and when major developments are proposed, prepare a sustainability statement.

Local Plan Review

The Council is in the process of reviewing the Local Plan adopted in 2015, with the timetable for this work set out in the Council's latest Local Development Scheme.

Chapter 2

Sustainable Design Expectations

The Council wants to work together with landowners, developers, designers and builders, to achieve zero carbon development. This document sets out our expectations regarding the sustainability of proposed new developments, and provides guidance to help applicants to deliver buildings which meet these expectations. It applies to all new proposals, residential or commercial, major or minor planning applications where building works are undertaken. It does not apply to householder applications.

2.1 The scale of the challenge for new buildings

In their Climate Emergency Design Guide (2020), the London Energy Transformation Initiative (LETI) concluded that, in order to achieve a zero-carbon built environment in the UK by 2050, all new buildings completed from 2030 will need to operate at net-zero carbon and so, by 2025 all new building designs must be capable of delivering net zero carbon.

This will need everyone involved in delivering the built environment to start learning how to deliver net zero carbon buildings now – a view shared by other organisations, including the World Green Building Council and Architecture 2030. Such buildings do not burn any fossil fuels, and their energy consumption must be below that which can be fully supplied by renewable energy. Their embodied carbon must also be considered.

Buildings being designed now will almost certainly still be in existence in 2050 – and so each one which does not achieve a zero-carbon balance now will be compounding the problem, and ultimately add to the number of existing buildings requiring deep retrofit to meet our climate change targets. This will incur further embodied carbon, and make it more difficult and expensive for the Borough to meet its carbon reduction targets, as the costs of achieving higher standards via retrofit are three to five times higher than for new buildings and the carbon impact of delayed action is significant [Currie & Brown, "A Report for the Committee on Climate Change – The costs and benefits of tighter standards for new buildings," 2019].

As well as moving towards zero carbon, new development also need to adapt to the changing climate – we are already experiencing these effects, and a further amount of change is already 'locked in' over the coming decades, due to the carbon already emitted. We can expect to more frequently experience extreme weather, including hotter summers, extended dry and wet periods,

and more intense rainfall events. The built environment will therefore need to adapt to increased risk of overheating and flooding in order to protect residents and property, and to reduce the costs and carbon emissions associated with retrofitting mechanical cooling and recovery from flooding.

2.2 Integrating sustainability into design

To meet the requirements of London Plan Policy D3 (optimising site capacity through the design-led approach), developers are expected to adopt key sustainability principles **from the earliest stages of a project**, to ensure that it considers the climate emergency and resource efficiency throughout its design, construction, operation, and lifecycle.

Further to this, every application submitted to the Council should, **from the outset of the design process**, support delivery of London Plan Objective GG6 (increasing efficiency and resilience) by taking every possible step to reduce its carbon footprint, as well as contributing to wider sustainability objectives in the development plan. It is not acceptable to design a scheme with a view to attempt to retrospectively 'green' it.

Developers will also themselves benefit from integrating sustainability considerations into all aspects of their designs from the earliest stages – **actions to reduce climate impacts and to address related environmental challenges are likely to be both cheaper to deliver, and more successful, if they are taken into account from the outset and considered at each stage of the design process.** Developers who can demonstrate that they have done so, e.g., within their development's supporting sustainability statement, will also benefit from reduced planning risk.

The sustainable design journey

Figure 2.1 shows how these sustainability principles align with the key stages of the design process. Building fabric and services, while the focus of this document, cannot be considered in isolation – this is just one stage of the sustainable design journey (see Stage 3 below), which will influence, and be influenced by, decisions made at other stages of the design process. This document should therefore be read in conjunction with Part A2 (Common Considerations) of the Hounslow Character, Sustainability and Design Codes SPD, which covers stages 1, 2 and 4 of the sustainable design journey in detail, under the headings identified by the **Common Considerations** in Figure 2.1. Issues with more complex solutions, such as air quality and overheating, may require action at more than one stage of the design process.

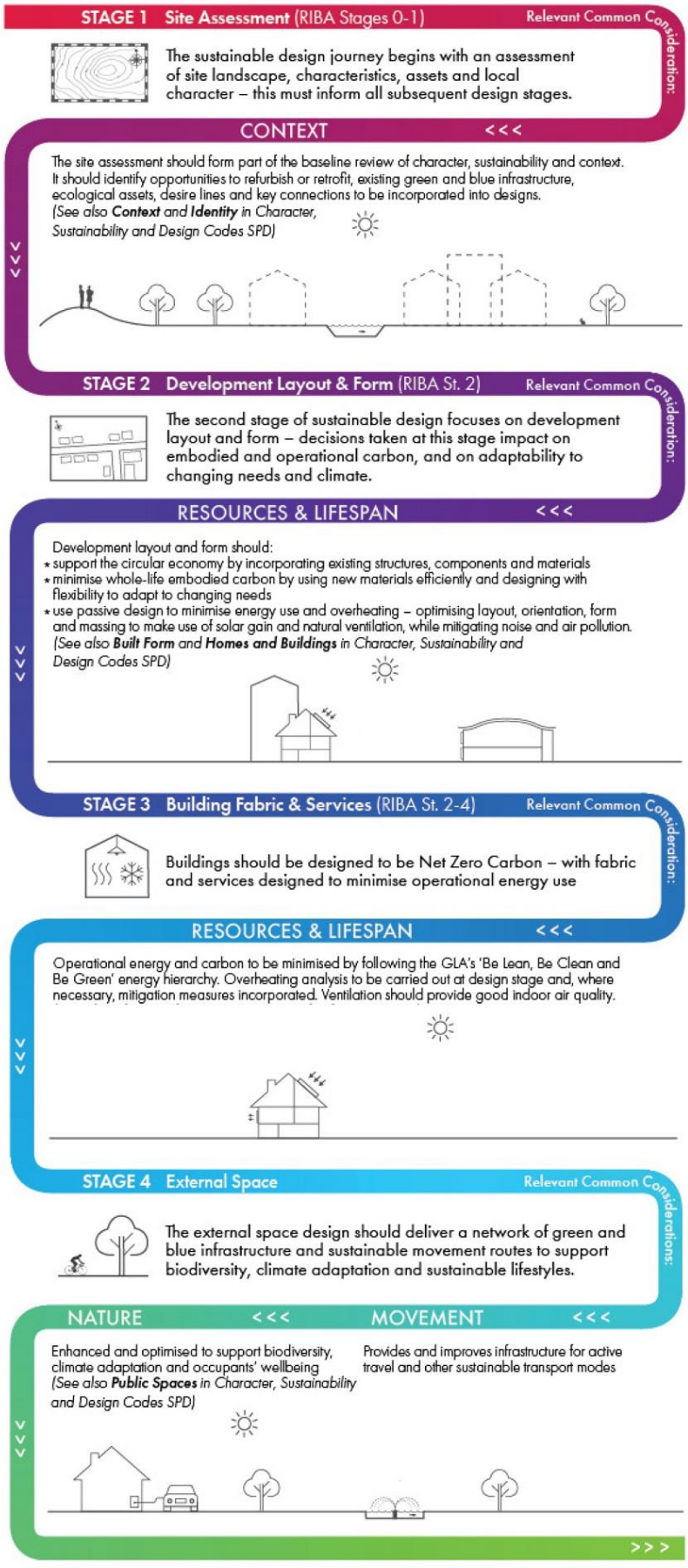


Figure 2.1 - Sustainable Design Journey, with key considerations at each stage

The full range of sustainability issues which need to be considered in new developments are identified in Figure 2.2. The items in blue along the top are those relating to Design Stage 3 (Building Fabric & Services), which are covered in detail in this document. Along the bottom, in red, are the wider aspects of sustainable design, relating to Design Stages 1, 2, and 4 (covering development layout, orientation, form and the design of its external environment). These are explored in detail in the Hounslow Character, Sustainability and Design Codes SPD.

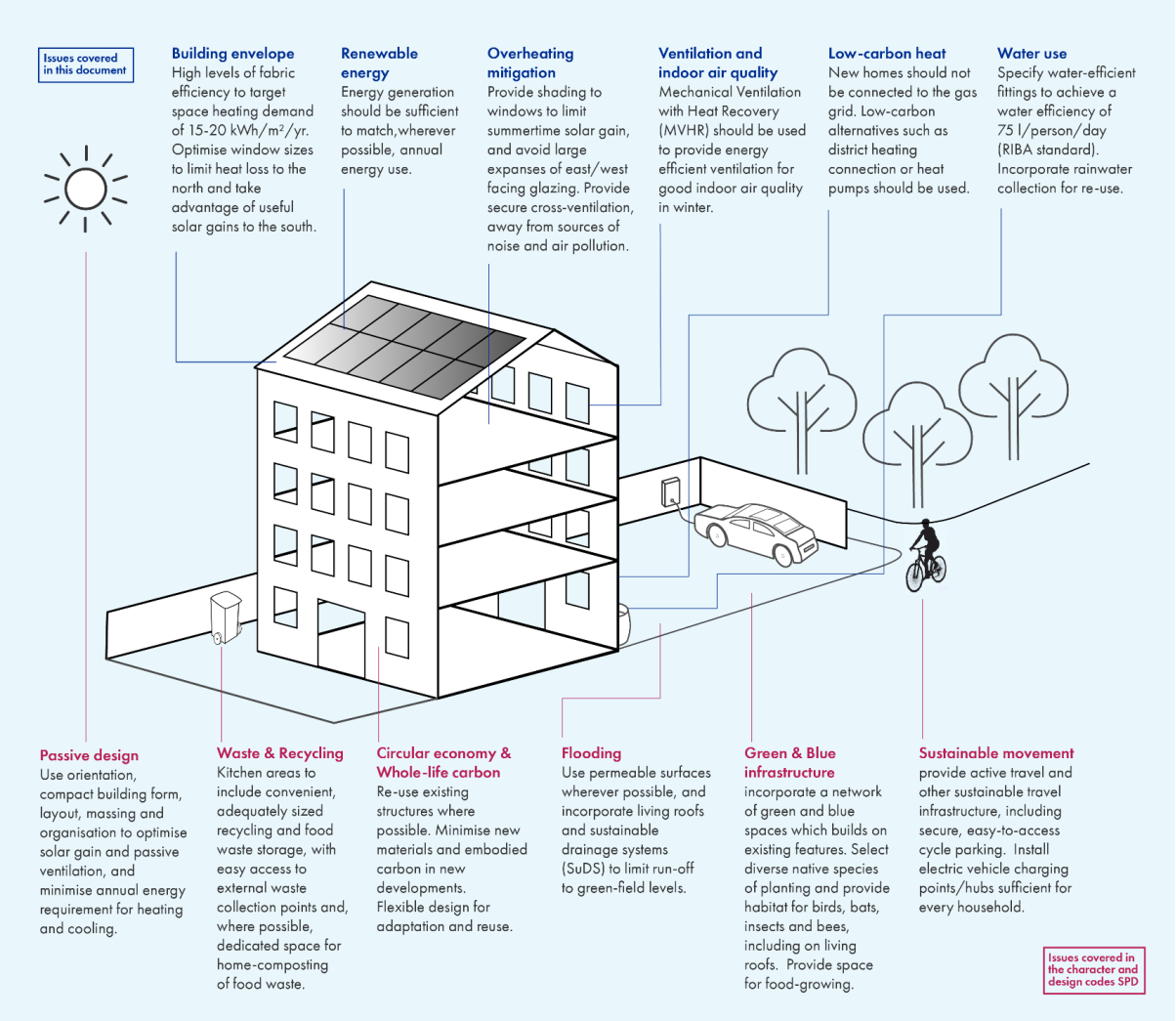


Figure 2.2 - Sustainability issues to be addressed through development design

2.3 Design for a changing climate

Delivering zero carbon and climate-resilient design requires that the whole design team understands their individual contributions, including to reducing operational energy and embodied carbon in a cost-effective way. A 'golden thread' of responsibility should run through all RIBA stages, I.e., from pre-design, through construction and into operation, to ensure decisions are implemented and their operation verified.

To ensure this, developers should:

- Appoint key suitably qualified design team members to improve operational energy performance (and other sustainability outcomes) early in the design process. Investment in design will be very likely outweighed by reduced planning risk.
- Commit to energy benchmarking exercises and set established performance targets early in the design process - ideally prior to commencement of concept design (RIBA Stage 2).
- Ensure that life cycle cost analysis and whole life carbon analysis are carried out for all projects, giving both appropriate weighting in value engineering decision making.

Design teams should:

- Design in accordance with the recommended key performance targets for embodied and operational carbon for each building archetype, as set out in Chapter 3 below and in the Character, Sustainability and Design Codes SPD.
- Ensure that design decisions reflect the energy hierarchy - seek to limit building energy demand through passive measures and efficient fabric design prior to considering systems' optimisation to satisfy demand.
- Design to recommended heating and hot water coefficients of performance (COP). This includes heating, cooling, hot water and lighting demand kWh/m^2/yr, as set out in sections X and Y below.
- System design to be carried out with consideration of both regulated and unregulated energy end uses.

The Public Practice Note PN014 – Road Map to Achieving Net Zero Carbon for New Homes Projects sets out in more detail the activities which need to be undertaken at each RIBA development stage, in order to deliver Net Zero development.

2.4 Validation Requirements

A sustainability checklist accompanies this document, covering a range of key themes (**Annex B**). This does not form part of the SPD, but comments can be made on the proposed checklist questions when responding to this consultation draft SPD. The Council will consider any comments received on the checklist before seeking to incorporate it into the Council's existing Validation Requirements for planning applications.

Each theme includes a series of sustainability measures, for each of which up to three levels of aspiration are defined, as set out in Table 1.

Table 1: Sustainability checklist levels of ambition

MINIMUM REQUIREMENT / LOW ASPIRATION	MEDIUM STANDARD or ASPIRATION	HIGH STANDARD or ASPIRATION
Just meets minimum requirements (e.g., Building Regulations); or, where no such requirements are defined,	A higher standard or aspiration, compatible with Net Zero-Carbon (or Waste) by 2050	An exemplary standard, which – where relevant – is in alignment with our Climate Declaration target for Net

represents a low level of aspiration (i.e., typical standards which most applicants are used to delivering, but not consistent with climate targets)		Zero-Carbon (or Net Zero Waste) by 2030

To meet the Council's validation requirements, applicants will need to:

Complete the sustainability questions under each of the themes relevant to their project, indicating the proposal's expected performance against key measures, such as for carbon reduction. Applicants are strongly encouraged to consider these measures early in the design process, and should be prepared to discuss the measures at the pre-application stage

Submit a completed sustainability checklist alongside their applications to demonstrate the extent to which they have taken on board the principles set out in Section 2.2. Outline planning applications need only to complete those questions marked for them. **Attention to the measures set out in the checklist will facilitate smoother progress of proposals through the development management process**

Demonstrate how they will ensure that design-stage sustainability ambitions are recorded and progressed during construction and post-completion

The checklist responses will be assessed in the round to ensure a holistic approach to sustainability is being considered, covering all the necessary issues and in the right order. This will also ensure that other processes are joined up with what is being required by this SPD. Each theme will be assessed in the context of factors that may be unique to a development, providing flexibility in how each development is assessed. The applicant is expected to identify unique sustainability aspects of their development and include these in the 'Sustainability Statement'.

The validation process, including the sustainability checklist, will confirm that applicants have complied with the specific policy requirements within the Development Plan which apply to different scales of development. The requirements relating to climate and sustainability are set out in Table 2 below. Where these requirements are not met, the application will be refused.

Table 2: Key Development Plan sustainability policy requirements for new developments

Requirements for all non-householder applications (including Minor Applications):	Further Information:
Net Zero – All new developments, commercial or residential, major and minor, are required to be as close as possible to Net Zero Carbon for regulated energy use (on site, unless demonstrated that is not possible). At a very minimum, a scheme must achieve the minimum standard set out in the London Plan – that is, an on-site reduction of 35% below Building Regulation Standards (as set out in Part L 2021. Schemes should seek to meet the LETI targets for embodied carbon. All schemes that can demonstrate positive steps have been taken to reduce embodied carbon should do so within the Energy and Whole Life-Cycle Carbon Assessments, as this will weigh positively in the overall planning balance of the scheme.	Chapter 3 of this document See attached checklist (Annex B) and Character, Sustainability and Design Codes SPD – A2.32, A2.52-64
Carbon Offsetting – If it can be demonstrated that it has not been possible to achieve net zero-carbon on-site, a contribution to the Council's Carbon Offset Fund will be required to offset the residual emissions.	Section 3.3 of this document
Biodiversity Net Gain – Most developments (with some limited exceptions) will be required to achieve a minimum 10% biodiversity net gain on site once the mandatory biodiversity net gain requirements come into force.	Character, Sustainability and Design Codes SPD – A2.156-160
Travel Plan – Required for any development where there will be a significant transport or highways impact	Character, Sustainability and Design Codes SPD – A2.79-94
Additional requirements for all Major Applications:	**Further Information:**
Energy Statement/Assessment – Required for all new builds, and all applications for major developments. Should include a detailed energy strategy to demonstrate how the zero-carbon target will be met within the framework of the energy hierarchy.	Section 3.2 of this document
'Be Seen' energy monitoring – all major developments are required to monitor and report actual operational energy performance for at least five years post-occupancy in line with policy SI 2 in the London Plan 2021 and the GLA's 'Be Seen' Energy Monitoring Guidance 2020, or equivalent.	Section 3.2 of this document
Urban Greening Factor – All major developments are required to incorporate urban greening, achieving at least an Urban Greening Factor of 0.3 (for predominantly commercial development) or 0.4 (for predominantly residential development) as per London Plan Policy G5.	Character, Sustainability and Design Codes SPD – A2.171-178
Drainage Assessment – All major developments are required to demonstrate that they would achieve a greenfield run-off rate and manage water as close to its source as possible, through the use of Sustainable Drainage Systems (SuDS)	Character, Sustainability and Design Codes SPD – A2.151-155
Transport Assessment and **Travel Plan** – must adhere to TfL's Healthy Streets approach and include an Active Travel Zone survey.	Character, Sustainability and

	Design Codes SPD – A2.79-94
Air Quality Assessment – required for all major applications, and encouraged for ***all*** applications. The London Plan requires new developments to be Air Quality Neutral. Developments are encouraged to be Air Quality Positive where possible.	Character, Sustainability and Design Codes SPD – A2.232; See also Air Quality Technical Guidance (to be published in 2023)
Health Impact Assessment – In the 'Rapid HUDU' model which most consultancy firms use as their template gauge, there is a section on Climate Change as well as Air Quality.	
Additional requirements for applications referable to GLA:	**Further Information:**
Whole Life Cycle Carbon Assessment – targeting/demonstrating carbon-neutrality for the lifetime of the development (i.e., including the embodied carbon resulting from the sourcing of materials and the construction process).	Character, Sustainability and Design Codes SPD – A2.32, A2.52-64
Circular Economy Statement – Required by London Plan Policy SI7 to demonstrate how a development, including any public realm and supporting infrastructure, will incorporate Circular Economy measures into all aspects of the design, construction and operation.	Character, Sustainability and Design Codes SPD – A2.52-64

The guidance in this document is based on the best of our knowledge at the time of writing. However, what is considered to be good practice will continuously evolve, and this may happen rapidly is some areas of emerging knowledge, such as on embodied carbon. Also, it is acknowledged that we cannot provide guidance on every possible scenario. The overarching ask of design teams is therefore to consider the carbon and sustainability impact of what they do at every stage of the design process. This document should be read in conjunction with the latest guidance and technical toolkits available, including (but not limited to) those from the UKGBC, RICS, CIBSE, and the RIBA – see links to suggested sources in the 'Further Information' sections. Further advice on building design may be sought through the Council's pre-application advice service.

Chapter 3

Towards Zero Carbon

This chapter focuses on the Council's required standard for new low and zero carbon properties and offers guidance on how this might be achieved.

EXISTING REQUIREMENTS – KEY LOCAL POLICY & GUIDANCE:

Developers should have regard to the following Development Plan policies:

London Plan:
CHAPTER 9 – Sustainable Infrastructure: SI2 (Minimising greenhouse gas emissions); SI3 (energy infrastructure); SI4 (Managing Heat Risk)
RELATED GLA GUIDANCE: Energy Planning Guidance (2022); Carbon Offset Guidance (2022); 'Be Seen' Energy Monitoring Guidance;

See also:
- GLA's 'Energy Planning' guidance on preparing energy statements
- GLA 'Be Seen' Energy Monitoring Guidance

Local Plan:
CHAPTER 9 – Environmental Quality: EQ1 (Energy and carbon reduction) EQ2 (Sustainable design and construction)

Developers should also have regard to the National Design Guide 2019:
Resources Section, paragraph 135 **–** well-designed places and buildings conserve natural resources including land, water, energy and materials. Their design responds to the impacts of climate change by being energy efficient and minimising carbon emissions to meet net zero by 2050. It identifies measures to achieve:
- mitigation, primarily by reducing greenhouse gas emissions and minimising embodied energy; and
- adaptation to anticipated events, such as rising temperatures and the increasing risk of flooding

3.1 Development Plan and Net Zero requirements

London Plan Policy SI2 requires major development to be 'net zero carbon' – that is, emissions should be reduced so they are as close as possible to zero for regulated energy uses – heating, lighting and cooling.

This is to be achieved by following the London Plan energy hierarchy, as set out in Section 5.2 below. (Unregulated emissions, such as those from white goods and other plug-in items, are excluded from this policy, although consideration should also be given to minimising these). Hounslow Local Plan Policy EQ1 (d) sets out the expectation that all developments should meet the carbon emissions reduction requirements set out in the London Plan. As such, minor residential development will also be expected to be net zero carbon.

There is also a minimum requirement for major schemes to achieve a 35% reduction in *on-site* emissions below Building Regulations Part L 2021 standards (this equates to approximately 55% improvement over Part L 2013), which also effectively eliminates the use of gas boilers. Failure to achieve this will result in applications being refused, unless there are extenuating circumstances. Minor schemes are also strongly encouraged to adhere to the same standards – this will weigh heavily in the planning balance.

Due to the decarbonisation of the electricity grid (as reflected in the updated carbon factors in Part L 2021), a greater improvement over Part L can now be achieved with no increase in specification. As residential developments are therefore expected to be able to exceed the 35% reduction target, the GLA's Energy Planning guidance has introduced an additional benchmark improvement of 50% over Part L 2021 (equivalent to 65.5% improvement over Part L 2013) in which residential developments should be aiming to achieve. Indeed, analysis prepared for London boroughs in the updated Towards Net Zero Carbon Report (2023 - publication imminent), suggests that domestic buildings should be able to achieve at least a 60% improvement over Part L 2021. The GLA will periodically update their benchmark, and may also introduce more stretching benchmarks for other typologies, to reflect improvements in expected performance over time. The Future Homes and Future Buildings standards, expected to be introduced in 2025, will also see further tightening of Part L standards, and a requirement that new buildings will be 'zero carbon ready', i.e., not requiring retrofit work to benefit from electrification of heating.

Non-residential buildings

Some non-residential developments may initially find it more challenging to achieve significant on-site carbon reductions beyond Part L 2021. Analysis in the updated Towards Net Zero Carbon Report (2023 - publication imminent) suggests that the following targets for non-residential typologies should be achievable:

- Domestic buildings – Offices – 20% improvement over Part L 2021

- Schools – 40% improvement over Part L 2021
- Industrial buildings – 45% improvement over Part L 2021
- Hotels – 10% improvement over Part L 2021

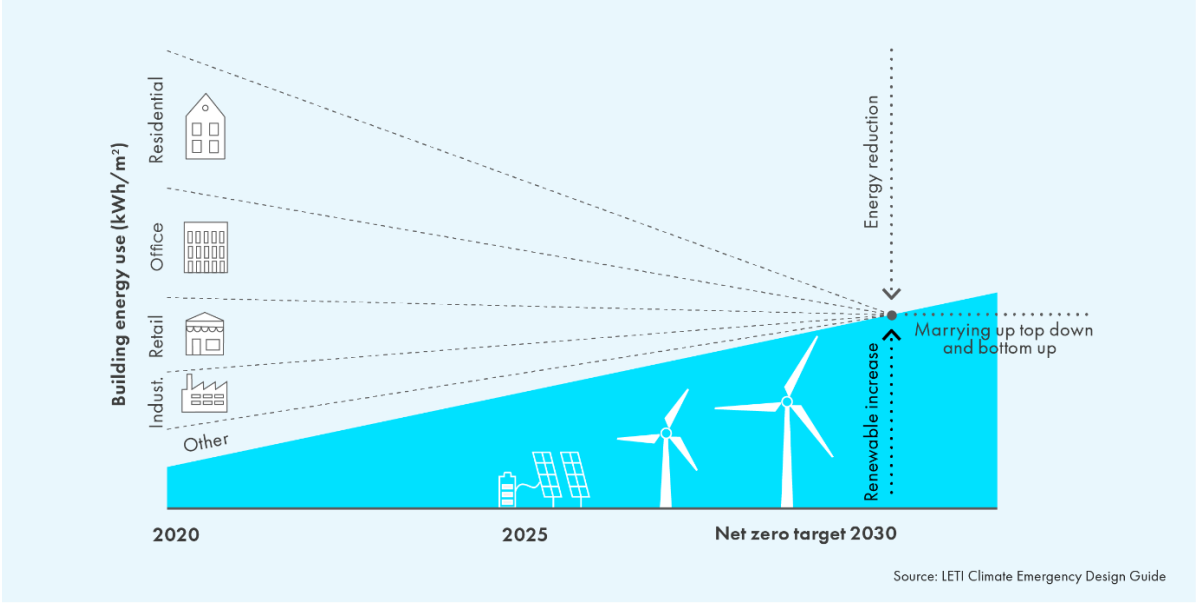
All planning applications must nonetheless continue to aim to achieve on-site carbon neutral standards by following the energy hierarchy set out in Section 3.2 below.

3.1.1 Beyond the development plan – operational zero carbon

Developers are encouraged to go beyond the current Development Plan requirements, and to aim for operational zero carbon on-site, in order to be consistent with the borough's climate change target and climate emergency declaration. The UKGBC have worked with LETI on the development of a simple definition for Net Zero Carbon new buildings (in operation), published in 2019 and now supported by the BBP, the Good Homes Alliance, RIBA and CIBSE. The full set of definitions can be seen in the WLCN-LETI document at: www.leti.london/carbonalignment. The requirements highlight the importance of the following elements:

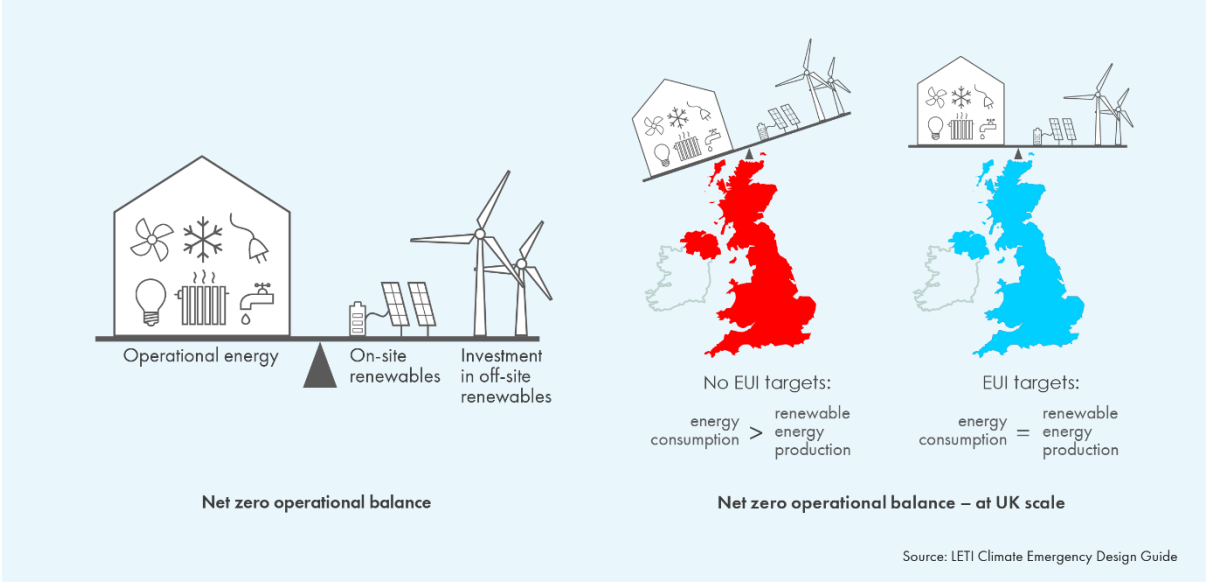
- **Ultra-low level of energy use –** minimising space heating demand and energy use intensity (EUI). In addition, peak demand reduction and demand management should increasingly be considered, to support the grid system and its decarbonisation.
- **No fossil-fuel use on-site** – e.g., use heat pumps or low-carbon district heating
- **Measurement and verification** – monitoring and disclosing building performance in use.
- **Operational zero carbon balance** – i.e., at least 100% of the energy used – including that needed for unregulated uses – is produced by renewable energy sources which demonstrate additionality; on-site wherever possible, only relying on off-site solutions as the last step, if needed, for additional carbon reductions. This means that an operational carbon balance is met, without the use of carbon offsets.
- Direct emissions from renewables and any upstream emissions are 'offset'

Net Zero at a national level requires the decarbonisation of energy drawn from the National Grid through the use of renewable energy sources. While grid decarbonisation itself is outside the scope of this document, developments nonetheless have an important role in ensuring that a 'zero carbon balance' is achievable at a national level. Because the amount of renewable energy that the UK can produce is finite, there is a limit to what is available for use by each building; developments therefore must not exceed an 'energy budget' – including for unregulated uses – otherwise a zero-carbon grid will not happen.



Source: LETI Climate Emergency Design Guide

The lower the energy demand of the building, the easier it is for it to achieve net zero in use, and also for the country to achieve net zero. A net zero carbon building is therefore first and foremost an energy efficient building.



Net zero operational balance

Net zero operational balance – at UK scale

Source: LETI Climate Emergency Design Guide

3.1.2 Energy Use Intensity vs. SAP/SBEM

Energy Use Intensity (EUI) is an annual measure of total energy consumed in a building, including both regulated energy uses (heating, hot water, cooling, ventilation and lighting) and unregulated uses (plug loads and equipment). A significant advantage of using EUI is that it can be estimated at design stage and then, unlike the SAP or SBEM software used for Part L compliance, it can be easily measured post-occupancy through energy bills. Its use as a measure to drive energy efficiency is recommended in both LETI's Climate Emergency Design Guide (2020) and the UK Green Building Council's Net Zero Whole Life Carbon Roadmap (2021). The Mayor of London's Energy Assessment Guidance now also requires that applicants determine and report EUI and space heating demand for all new major development, to improve our understanding of energy demand and drive more energy efficient design of buildings.

The LETI Climate Emergency Design Guide (2020) has calculated target EUI values which are consistent with achieving a zero-carbon grid. More recently, the Towards Net Zero Carbon Report (2023 update) has set out exemplar targets which ought to be achievable by a range of typologies. Based on these, Table 3 below sets out good practice EUI target values for a range of building archetypes.

Table 3: Energy Use Intensity and Space Heating Demand targets for different typologies

Building Archetype	Energy Use Intensity (EUI) (kWh/m^2/yr)	Space Heating (or where relevant, cooling) Demand (kWh/m^2/yr)
RESIDENTIAL (detached, semi-detached & end-of-terrace)	35	20
RESIDENTIAL (all other typologies)	35	15
OFFICES / RETAIL	70	15
SCHOOLS	65	15
LEISURE	100	15
HOTEL	160	15

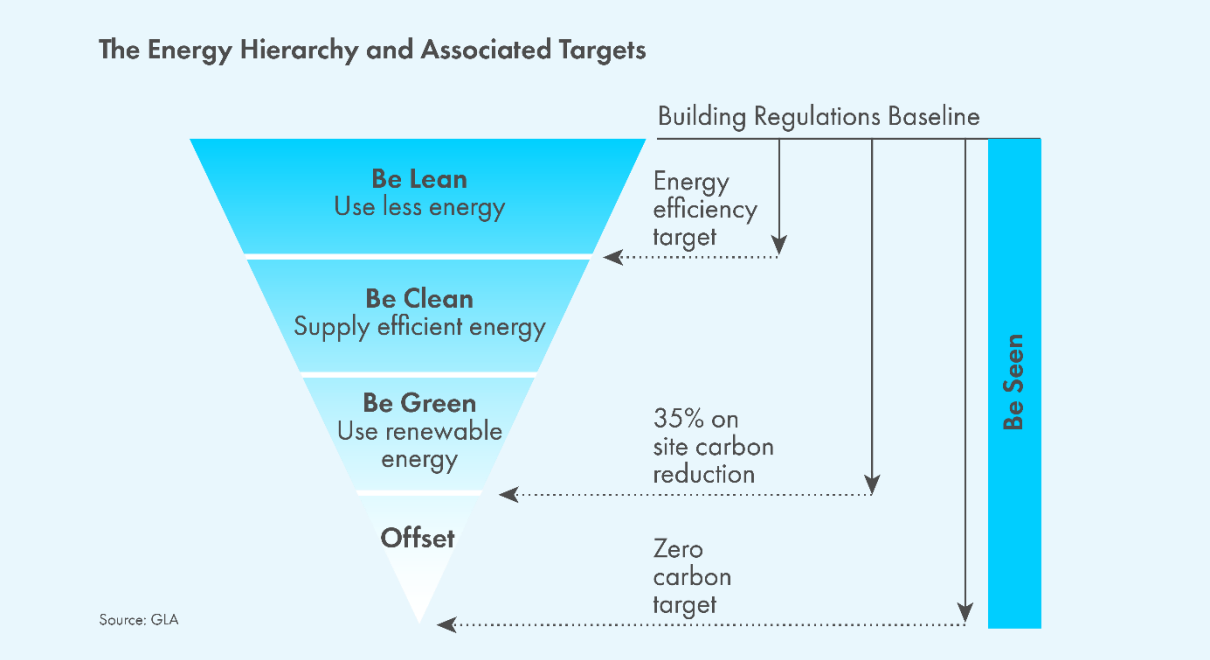
All new development in the borough should make reasonable endeavours to achieve these targets, in order to help tackle fuel poverty and future-proof their development. In domestic properties, this will generally require good practice fabric and ventilation standards, in combination with low carbon heating such as heat pump or connection to a low carbon communal system – which is consistent with the requirements of the energy hierarchy set out in the next section. As the EUI targets include unregulated energy uses, developers are also encouraged to specify and install low energy plant such as lifts, and efficient appliances which do not rely on fossil fuels, such as induction hobs.

Design stage predictive energy modelling calculations can be used to indicate whether these energy use targets are likely to be met. While consumer uses (TVs, computers, etc.) are not in developers' control, these can be expected to average out between high and low energy-use occupants in post-occupancy surveys of major developments. LETI have produced a Net Zero FAQs document which provides further information on how to calculate EUIs, including for buildings connected to a district or communal heating system.

3.2 The London Plan Energy Hierarchy

The London Plan sets out an energy hierarchy, which developments must follow to achieve the net zero requirement:

a) **Be Lean** – Construct the Development sustainably, to minimise the energy needed for heating, cooling and lighting
b) **Be Clean** – Connect to a heating network; or, if that is not possible or feasible, another source of clean heat
c) **Be Green** – Use on-site renewable energy to cover residual energy needs (including for plug-in loads)
d) **Be Seen** – Monitor, verify and report on energy performance



Energy Assessments

Applicants must prepare an Energy Statement/Assessment to demonstrate the carbon efficiency of their development, and submit this as part of a planning application – it is a validation requirement. Energy assessments should be constructed in accordance with this energy hierarchy, as set out in the Mayor of London's Energy Assessment Guidance (as updated in 2022).

The purpose of the energy statement is to plot the percentage emission reductions achieved relative to the Part L 2021 baseline, through each of the Be Lean, Be Clean, Be Green headings. Where this meets the London Plan minimum requirement but falls short of being carbon neutral (i.e., a 100% reduction for regulated energy use, including renewables), the applicant would need to demonstrate why further carbon savings could not be achieved. To evidence this, it must be clearly shown that a carbon-neutral aspiration was considered fully at the beginning of the design process for the building. Where there is a justifiable shortfall, a scheme will be required to make a contribution to the Council's Carbon Offset Fund (see section X below).

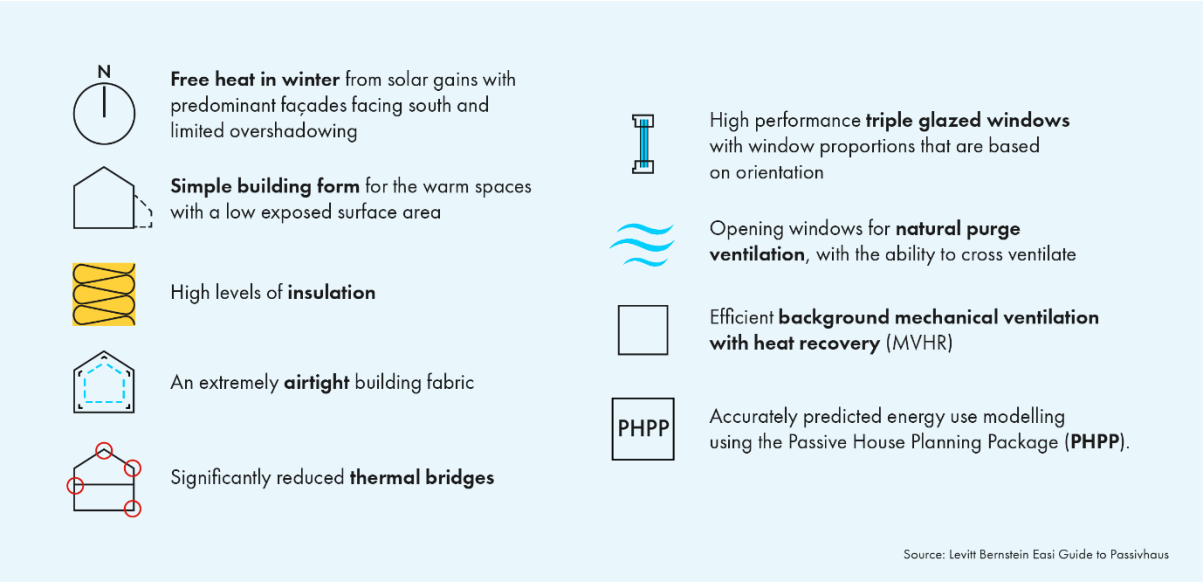
Energy Hierarchy Stage 1: Be Lean – Fabric Efficiency

The first stage of the energy hierarchy centres around ensuring that the development fabric itself is constructed in a manner which minimises or eliminates energy needed for heating, cooling, ventilation and lighting. First and foremost, this means that all developments must significantly reduce their energy demand through maximising their thermal performance by adopting a fabric first approach, promoting comfortable and healthy indoor conditions and protecting the building fabric from the environment. This 'fabric-first' approach must be incorporated from the start of the design process to ensure the appropriate measures are incorporated into the scheme.

The London Plan requires an increase in fabric energy efficiency of at least 10% beyond Building Regulations standards for residential developments, and 15% for non-residential. This requirement remains in place with the introduction of Part L 2021, though it is recognised that this may be challenging to achieve, given the introduction in Part L 2021 of the Target Fabric Energy Efficiency Standard (FEES), Target Primary Energy Rate, and of wastewater heat recovery (WWHR) in the 'notional specification' for the target emission rate (TER). Nonetheless, all schemes should aim for at least some improvement in fabric energy efficiency standards over Part L 2021.

Developments must optimise energy efficiency with fabric and other passive solutions prior to adopting and sizing any strategies and systems required to keep the building comfortable, such as ventilating, heating and cooling. This will not only reduce the size and capital cost of plant equipment, but will also reduce the cumulative demands made of the national grid infrastructure.

Developers can achieve this by adopting recognised and successful fabric first approaches such as Passivhaus (NB: other independent assessment methodologies also exist, such as the Home Quality Mark and BREEAM). They may find it helpful to refer to the Easi Guide to Passivhaus Design. This sets out the ten key considerations for minimising energy use through passive design, as summarised in the diagram below:



These considerations should, wherever possible, be incorporated into the design of all proposals. In addition, developers should consider the following good practice approaches in their building designs:

- Keep cold / unheated spaces, such as bin/bike stores and substations grouped together, separate from or towards the north end of buildings where possible. When these spaces are neighbouring a warm part of the building, such as a dwelling, the party wall and separating floor above need to be highly insulated.
- Draw the insulation and airtightness line around dwellings early and consider whether circulation space should be within or outside of the insulated volume.
- Expose thermal mass (such as brick or blockwork) inside the building to help to reduce internal temperature fluctuations.
- Specify and install low energy plant such as lifts, and efficient appliances which do not rely on fossil fuels, such as induction hobs (this will not improve performance against Part L but may improve EUI scores).

NB: The relative improvement approach against a notional building, as used for Part L compliance, does not reward the significant energy and carbon savings which may be achieved through more efficient building forms, optimising orientation and other passive design techniques which work alongside fabric efficiency measures to reduce energy use. These techniques should be considered in Stage 2 of the design process set out in Section 2.2, and are described in more detail in the Hounslow Character, Sustainability and Design Codes SPD. (See Passive Design – A2.34-39; Built Form – A2.73-78; and Homes and Buildings – A2.218-232)

Reducing the performance gap

The performance gap is defined as the deficit between predictions of energy consumption from building compliance tools and actual measured energy use during operation of new developments. Studies undertaken by Innovate UK and the Zero Carbon Hub show that the majority of built projects do not meet their intended performance targets when tested, falling short even of compliance with Part L and Part F of the Building Regulations. Independent research carried out by the UK Passivhaus Trust determined an average performance gap of 40% between the overall energy use of a new build house when compared to its EPC modelling.

While some of the gap relates to variations in how buildings are used in practice, many of the contributory causes to the performance gap can be attributed to:

- a 'design for compliance' culture in which a short-term objective − compliance with regulations − is sought with little regard to how the building will actually perform in operation. The consequences of this approach are evident in much of our existing building stock, with operational performing much worse than anticipated at design
- Quality and execution of construction, resulting in design intent not being realised – e.g., product substitutions, gaps in insulation and insufficient care taken in relation to air-tightness and thermal bridging.

To deliver a 'fabric first' approach, it is critical that developers and contractors take action on both design and construction quality to address the performance gap in new homes and buildings. Contractors should understand how to construct buildings which:

- achieve high levels of airtightness in practice

- reduce / eliminate the effects of thermal bridging
- avoid other gaps in the insulation barrier during and following installation

The full implications of specification substitution must be clearly defined.

Applicants are recommended to use an independent, verified design for performance methodology such as Passivhaus PHPP or CIBSE TM54 Operational Energy, to ensure that the development's operational energy performance reflects realistic design intentions on its use, occupancy and operation, and that it addresses the performance gap.

Energy Hierarchy Stage 2: Be Clean – Heating Infrastructure

The second stage of the hierarchy requires developers to demonstrate how their developments will supply space heating and hot water efficiently and cleanly. All new developments are required to use low carbon, non-fossil fuel, heat. Any development that proposes to use gas or other fossil fuel systems will need to provide robust justification to satisfy the Council that low or zero carbon systems cannot be used, to set out how the development has been future-proofed to achieve net-zero carbon by 2050, and to demonstrate that the gas-powered system is credibly being used as a stepping-stone towards this objective.

In achieving these aims, attention should also be paid to minimising the risk of fuel poverty – e.g., by ensuring that the cost to occupants of using the required levels of heating or cooling are lower than they would be under the base case scenario.

Applicants should use the LETI Heat Decision Tree (p. 76 of the LETI Climate Emergency Design Guide) throughout the design stages of their project, to assist them in choosing the most appropriate heating system.

District, shared and communal heating systems

The London Plan requires that major development proposals within Heat Network Priority Areas (which includes most of the Borough) should have a communal low-temperature heating system; and that these should, wherever possible, connect to an existing or planned district heating system, subject to them meeting the low-carbon criteria set out in the London Plan, and the energy provider confirming that there is capacity.

The Local Plan also requires that, where district networks do not currently exist, developments should make provision to connect to any potential future decentralised energy network in the vicinity of the site, having regard to opportunities identified in area-specific energy plans. Applicants should consult the Council at the design stage of a development proposal for the latest information on decentralised energy network development, to establish potential connections.

Several potentially viable low carbon networks have been identified by the Hounslow Heat Map and Energy Masterplan, completed for the Council in 2022. Also, Local Plan reviews for the West of Borough and the Great West Corridor opportunity areas have identified development opportunities that we believe may have the potential for a district or communal heating system, such as in Brentford, the Hounslow Town Centre and Feltham Housing Zones, Bedfont Lakes Neighbourhoods, Heathrow Gateway and the Convent Way Estate Regeneration. Major developments in such locations are therefore expected to prioritise investment in the development of proposals identified in these or subsequent documents, in conjunction with other nearby developments if relevant. Proposed Heat Network Zoning Regulations, expected to be introduced by 2025, may, in future, make this a legal requirement where networks are identified as offering the lowest cost source of low carbon heat.

If a feasibility or viability assessment demonstrates that connection to an existing or planned low carbon district network is not reasonably possible, proposals should develop and/or connect to a shared heat network (SHN) with neighbouring existing buildings and/or new developments. To achieve this, the development itself could become an energy 'hub' which provides heat, via a heating network, to one or more existing neighbouring buildings; alternatively, the development could be supplied with heat from an energy centre within a nearby building or development. Such systems should prioritise the use of zero-emission or local secondary heat sources (in conjunction with heat pump, if required). Given that the carbon savings from gas engine combined heat and power (CHP) systems are declining due to the decarbonisation of the national electricity grid, and increasing evidence of adverse air quality impacts, their use is discouraged in the new London Plan in favour of electrification of heat, and existing systems will need to be decarbonised.

It is noted that district heat network operating economics need very careful consideration where they are connected to new high efficiency buildings. When heat demand is significantly reduced, eventually down to the level of 'Heat Autonomy', where most heat needs are met from incidental internal gains, there is little energy delivery cost revenue for the network operator. Network distribution losses can become larger than the quantity of delivered heat. This is likely to be reflected in significant fixed connection and services charges being the dominant energy bill component. While this suggests that district heat networks should be focused on serving the difficult-to-decarbonise existing building stock, connection may still be viable for new developments within easy reach of these networks. Joining Heat Sharing networks may remain particularly relevant for those strategic mixed-use development sites where opportunities for load-shifting and heat sharing occur (may also provide low carbon cooling, if needed under for future climate scenarios).

System Design

The design of district, shared or communal heating systems should seek to minimise system temperatures and to harness waste heat where possible. Lower system temperatures allow for increased system efficiencies and lower losses in conversion, storage and distribution of heat. Demand circuits with lower flow and return temperatures also have a greater opportunity to harness waste heat from local infrastructure level, such as from London Underground ventilation, industrial processes, water treatment and waste treatment works, for use in heat-sharing ambient loop networks.

Low temperature systems are also particularly useful in mixed use developments where there are different heating (and cooling) demand profiles, offering opportunities for load shifting and heat

sharing. This also helps reduce 'urban heat island' (UHI) impacts caused by the heat rejection from building cooling systems.

The necessity of a network of underground pipes to distribute heat can, if considered at an early enough stage in the design of site layout, be turned into a positive feature. If the design enables district heating pipework to be incorporated into green corridors rather than covering it with hard paving, this could result in lower installation and maintenance costs, while also providing space for nature, with the attendant benefits for biodiversity, well-being, air quality, sustainable drainage and urban cooling which that provides. The design of such green infrastructure, and the benefits which they provide, are described in more detail in the Hounslow Character, Sustainability and Design Codes SPD. (See Nature – A2.133-180; and Public Spaces – A2.181-187)

Electrification of heat

Electrification will likely play a major role in decarbonising heat. As well as becoming a lower carbon energy source with the decarbonisation of the national grid, electricity also provides air quality benefits which are particularly important in a London borough. Technologies that can convert electricity into heat include heat pumps and direct electric heating systems. Where district or communal heating is not viable, individual heat pumps will usually be the next best option – demonstrating significant carbon reductions with the new carbon factor for electricity in Part L 2021.

Proposals using direct electric heat will only be deemed acceptable if the developer can demonstrate, through Passivhaus certification or equivalent, that energy use has been significantly reduced by achieving ultra-high fabric efficiency. This is to ensure that direct electric heating systems do not result in high energy bills.

Heat pumps are more efficient and, because they use low flow temperatures and large emitters to spread heating throughout the day, they reduce peak heating demand compared to direct electric systems. Developments proposing to use heat pumps must demonstrate that these are of high quality and achieve a good standard of fabric efficiency suitable for low temperature heating, to ensure they do not result in high energy bills.

LETI recommend the following ways in which the switch to heat pumps can be supported:

Lower operating temperature – Building heating systems which can operate at lower temperatures are better placed to make use of renewable technologies (heat pumps, solar thermal etc.) which work most efficiently at relatively low temperatures. A common example of how this can be achieved is by specifying underfloor heating (UFH) instead of radiators for space heating. Whereas radiators typically require a water flow minimum temperature of 45-55˚C, UFH can operate at flow temperatures as low as 25-35˚C because of its larger surface area for transferring the required heat into the room. This larger warm surface area also means comfort levels can be achieved at lower room air temperatures. The same principle in reverse applies to room cooling in summer. Improved fabric efficiency also means that comfortable air temperatures can be achieved with a lower system temperature.

Furthermore, lower operating temperatures for communal systems mean that – along with careful design and installation of the system infrastructure within buildings – will minimise the risk of heat leakage which results in excess heat in summer.

Lean Design – Rather than applying the generous oversizing margins buried in conventional rules of thumb when carrying out heat loading calculations, detailed load modelling will provide better

predictions of energy use and help size plant requirements more accurately. Furthermore, sizing heating plant capacity using the 96th percentile approach rather than providing capacity for the full load at design conditions, reduces the heat generation equipment size and increases efficiency of the equipment in operation. Similarly, sizing and increased efficiencies are achieved by eliminating the rounding margins conventionally applied at each stage of design, plant selection and commissioning. As the thermal performance of a building improves, it responds more slowly to drops in outdoor temperature, permitting the use of less onerous outdoor design conditions. Highly insulated buildings also mean intermittent control strategies deliver reduced benefit due to limited room temperature drops during off periods. Consequently, a strategy of trickle charge over extended operating hours can greatly reduce plant capacities and improve energy efficiencies.

Harness Waste Heat – Capturing heat released as a by-product of an existing process enables this otherwise wasted heat to contribute to meeting energy demands. As well as standard heat pumps, waste heat can also be captured from activities or processes at different scales. Waste heat from exhaust air, cooling heat rejection and refrigeration systems in buildings can be reused as a heat source for space heating and domestic hot water systems, whilst also contributing to a reduction in the 'Urban Heat Island' (UHI) effects. New developments are also encouraged to incorporate waste-water heat recovery systems.

Energy Hierarchy Stage 3: Be Green – Renewable Energy

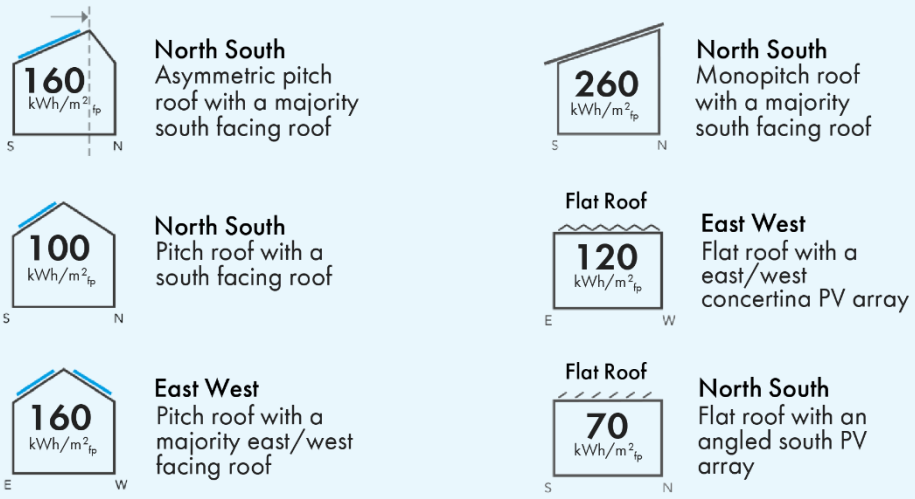
As explained by LETI in their Climate Emergency Design Guide, in order to genuinely operate at net-zero operational carbon, all buildings must be 100% powered by renewables. As UK renewable energy generation increases, grid electricity will continue to decarbonise. However, electricity demand in the Borough is expected to increase as a result of population growth, the electrification of heat and increased uptake of electric vehicles. To limit pressure on the national electricity grid, the council requires all development to demonstrate that on-site renewable energy generation has been maximised.

The use of renewable technologies provides new developments with a viable, cost-effective and practical opportunity to ensure that the heating and hot water they use are fossil fuel free, and will play a crucial role in achieving our net-zero carbon target [e.g. BEIS Clean Growth Strategy, 2017].

Wherever possible, 100% of energy demand should be met through on-site renewable energy generation – that is, the amount of renewable energy generation should be at least equivalent, on an annual basis, to the estimated total predicted energy use on-site (i.e., match the EUI which should have been minimised through the previous steps of the energy hierarchy). If this is not technically feasible, applicants must demonstrate that renewable energy generation has been maximised. Where a scheme is not zero-carbon and either the use or the efficiency rating of solar panels has not been maximised, then the scheme is at risk of refusal.

Photovoltaic (PV) Panels

For most buildings, the most feasible source of on-site renewable energy is likely to be photovoltaic panels (PV), which (unless the building is connecting to a district heating network) should be combined with heat pumps and solar thermal to provide the greatest benefit to new developments. Roof shape and orientation have a big impact on the amount of renewable energy which can be generated from solar PV – see panel below. These should be optimised from the earliest design stages to maximise solar PV outputs.



Roof design can be optimised to maximise energy output from photovoltaics. How well the roof space is utilised can be expressed in kWh generated per m2 of building footprint (kWh/m2fp)

Source: Cheltenham Climate Change SPD

Unless it is demonstrated that the site is overshadowed, buildings should achieve a predicted annual renewable energy generation of at least:

- 100 kWh/m^2 of building footprint for blocks of flats
- 150 kWh/m^2 of building footprint for houses

LETI have suggested the following renewable energy targets for different typologies:

	RESIDENTIAL	OFFICES	SCHOOLS
ONSITE RENEWABLE ENERGY GENERATION	100% of annual req. (small-scale) Cover 70% roof area (med- / large-scale)	Enough to meet requirements for at least 2 floors	Cover 70% of roof area

In the UK, it may be possible for apartment blocks up to six storeys high to achieve a net zero energy balance on-site with rooftop PV, heat pumps and efficient building fabric. Taller buildings which have a smaller proportion of roof area to floor area will require investment in off-site renewable energy which demonstrates additionality. LETI considers that the following to be acceptable:

- An investment into additional renewable energy capacity off-site
- A renewable energy power purchase agreement (PPA), for a minimum period e.g. 15 years.
- A green tariff that meets the guidance set out in the UKGBC Renewable Energy Procurement and Carbon Offsetting Guidance for Net Zero Carbon Buildings. (Other green tariffs are not acceptable.)

Such investment into additional renewable energy capacity is not considered an offset.

Other renewable technologies

For some developments, it may also be worth considering hydro-electric and wind turbines, but these are not expected to be feasible for most cases in Hounslow. Due to the carbon and air quality costs of producing, transporting and burning biomass, the Council does not consider this to be a sustainable source of energy.

Demand-side Management

Developers should include measures to reduce peaks in electricity demand and increase energy flexibility (that is, the ability to reduce consumption for a period of time, e.g., in response to external drivers such as energy price change, grid availability). Such measures can contribute to net zero carbon by making better use of renewable generation, and include:

Peak reduction – reduce peak energy demand through:

- Heating peak reduction – reducing peak heating demand through high performance fabric (slow to respond to changes in external temperature), a good level of airtightness, a compact form factor and thermal mass. An efficient heating system also reduces the heating peak demand. In particular, heat pumps installed into buildings with high fabric efficiency spread heating demand throughout the day
- Cooling peak reduction – appropriate glazing ratio, external shading, thermal mass, efficient cooling system and efficient lighting.
- Domestic hot water peak reduction – low-demand outlets, reducing distribution heat loss and installing an efficient heating system

Energy storage – should be considered to retain and release energy as required, providing system flexibility in response to specific energy demands. This includes:

- Hot water storage
- Thermal storage in communal or individual heating systems
- Battery systems to store excess generation to use when needed

Active demand response measures – heating set point control

Electric vehicle turn-down – Installing smart chargers to enable users to specify off-peak charging only (which may also reduce consumer costs), and allowing the electricity supplier to stop charging during times of peak grid demand

Behaviour change – incentives to reduce power consumption and peak grid constraints

Proposals should demonstrate (e.g., in their energy statement):

i) how they have made the best potential use of roof space to maximise local renewable and low carbon electricity and/or heat generation.
ii) How appropriate roof spaces have been utilised to maximise the delivery of multifunctional benefits, through the co-location of renewable energy plant with green, brown or blue infrastructure – such as green roofs to provide permeable surfaces to help store water and reduce surface run-off.
iii) How demand-side response has been incorporated

Character, heritage and other impact considerations

When considering renewable sources of technology, other planning matters, including appearance and impact on neighbours, should be considered. Developments in conservation areas or involving heritage assets need to provide careful consideration of how sustainable energy measures may be incorporated without adversely impacting on the character, function and preservation of a specific area or asset, in accordance with the policies on design in this Local Plan.

However, in such circumstances, development proposals should not presume that a viable sustainable solution cannot be provided. For developments in sensitive locations, priority should be given to more discreet locations for renewable technologies. The Council will determine whether the provision of sustainability measures causes any adverse impact upon the asset or area and, where appropriate, will prioritise safeguarding of the asset in line with the NPPF. Early pre-application engagement with the Council's planning and conservation teams is therefore considered critical to ensuring that an appropriate balance can be struck between preserving & enhancing our heritage assets and delivering renewable energy solutions on sensitive sites.

Impact on light/outlook to neighbours and noise disturbance should also be considered. Heat pumps should be set away from the boundaries of properties and sufficiently enclosed/mounted to ensure noise impact is minimised. Wind turbines of a large scale are likely to cause harm in an urban environment so will likely be objected to on constrained sites.

Energy Hierarchy Stage 4: Be Seen – Energy Monitoring

Post construction energy and quality monitoring is needed to develop a true understanding of a buildings' operational energy use, to determine whether a building and its systems work as expected when occupied, or where they do not, the extent of the performance gap (difference between predicted and as-built performance).

London Plan 2021 Policy SI 2 therefore requires that developers and owners of new major developments should monitor and report actual operational energy performance for at least five years post-occupancy through the 'Be Seen' portal, as set out in the GLA's 'Be Seen – Energy Monitoring Guidance' (September 2021).

The guidance provides a framework for reporting energy performance data for a scheme as planned, built out and in use into the 'Be Seen' portal. Performance indicators include contextual data, building energy use, renewable energy generation, energy storage and plant and carbon emissions. Where actual performance differs from estimated performance, developers are required to identify the causes and potential mitigation measures.

The onus is on the developer/ owner of the reportable units to provide this information, and this will be secured via a legal (S106) agreement. Details of the legal agreement (S106) wording may be found in the 'Be Seen – Energy Monitoring Guidance'. Further information on energy monitoring can also be found on the Zero Carbon Hub.

Post-occupancy Evaluation

For all new developments, design teams are also required to undertake a Post-occupancy Evaluation (PoE), assessing occupants' quality of life alongside actual operational energy performance. The evaluation should be undertaken within the first two years of a building's occupation.

A template PoE form is provided by RIBA and should be used to demonstrate compliance. Broadly, evaluation will be required at the following stages:

- Planning – predicted performance assessment
- As-built – performance assessment
- In-use – quality of life / wellbeing assessment

Assurance of Non-domestic Development

It is recommended for all new non-domestic developments to follow the BREEAM assessment methodology, and to provide the relevant certification as part of the submission.

3.3 Carbon offsetting

As stated in the London Plan, new development is expected to get as close as possible to operational zero-carbon on-site, by maximising possible reductions through the London Plan's energy hierarchy, as set out above. As permitted by the London Plan, the Council has extended this requirement to all development proposals, not just major development.

The Council therefore requires proposals to demonstrate that they have taken all reasonable steps to minimise on-site emissions. Only if developers can demonstrate that it is not possible to achieve zero-carbon on-site, will residual emissions be permitted. Any residual emissions must be offset by

a payment per tonne of carbon emitted per year, for 30 years, to the Council's Carbon Offset Fund, which has been set up by the Council to finance its own initiatives for addressing climate change in the borough. Contributions to the Fund should be seen as a last resort, an option to be used only once all other on-site carbon reduction options have been exhausted.

The Council will review all applications to ensure that a contribution to the Offset Fund is not used as an alternative to maximising carbon reductions on simple grounds of viability for a project. Where the developer contends the policy requirements in relation to viability of a particular proposal, the onus would lie with the developer to demonstrate what can viably be achieved through the submission of a viability assessment. We may seek payments from applications for the cost of independent viability assessment(s).

3.3.1 Carbon Offset Price

In order to genuinely deliver net-zero carbon development, carbon pricing must:

i) Drive on-site carbon savings by making it more cost effective for developers to deliver the savings on site than to pay carbon offset contributions; and
ii) Where offsetting is required, ensure that carbon offset contributions are sufficient for the local authority to pay for measures which achieve carbon savings equivalent to the carbon shortfall of the development.

Contributions to the Carbon Offset Fund are currently charged at a rate of £95 per tonne of CO_2e, in accordance with the London Plan and the GLA's Carbon Offset Fund Guidance (as updated upon publication of the 2021 London Plan). However, research undertaken for Hounslow and 18 other London boroughs to update the Towards Net Zero Carbon Report (update to be published in 2023), found evidence to suggest that this is too low to incentivise sufficient on-site savings. Indeed, following the adoption of SAP 10.1 carbon factors in Part L 2021, the cost of installing additional PV to achieve further improvement on site is now at least £340/tCO_2 (increasing from £190/tCO_2 under Part L 2013, as a result of the decarbonisation of grid electricity).

Research undertaken for the updated report also finds that:

- It would cost a local authority£480/tCO_2 to make equivalent carbon savings in a sustainable way, e.g., through retrofit, taking into account administration and management costs.
- A price of at least £350/tCO_2 is needed to incentivise further carbon-saving on-site, e.g., through additional PV panels, at 2023 carbon factors. (This is likely to increase as the grid decarbonises and thus more PV is needed to offset the same amount of carbon).
- On-site emissions reductions of up to 60% below Part L 2021 could be achieved with only small increases in construction costs, when modelled across several typologies. Furthermore, construction costs are typically less than half of total development costs, i.e., when the cost of land is included. For example:
    - A mid-rise residential block with air-source heat pump can achieve the GLA on-site emissions reduction target of 50% below Part L 2021, with only a 1.7% increase in construction costs against a Part L 2021-compliant baseline (including FEES) with gas boiler heating. This equates to a likely <1% increase in total development costs.
    - The same block with 'Be Lean' compliant, ultra-low energy fabric and heat pump would be 3.3% more expensive to construct than the baseline (so <2% increase in total development costs). With direct electric heating, it would actually be 1.3% cheaper to construct than the baseline.

It is therefore the Council's intention to seek to increase the carbon offset price from £95 per tonne to at least £350 per tCO_2, for major development in the Borough which does not achieve at least a 60% improvement in emissions over Part L 2021, which the evidence included in the updated Towards Net Zero Carbon Report (2023 - publication imminent) suggests would be approximately consistent with zero carbon objectives for new development (meeting Part L, GLA and LETI standards). Additionally, we could explore introducing a requirement that major development which achieves at least 60% improvement in emissions over Part L (2021), and all minor development, remains at the level recommended in the GLA's Carbon Offset Fund Guidance, currently £95 per tonne. This would be subject to developing an evidence base to support such a 'tiered' approach.

The exact value of the higher offset price, the threshold improvement under which it would need to be paid, and the date of implementation of this change, will all be subject to confirmation in due course, following further evaluation of the available evidence and viability testing. **Full consultation on any changes to the offset price, and the underpinning evidence, will be undertaken prior to implementation**.

In the meantime, in determining planning applications, the Council will attach significant positive weight to the achievement of building standards which achieve as close as possible to net zero carbon on site, in line with the advice set out in Section 3.2.

3.4 Designing for a Changing Climate

Developments will need to be designed with the changing climate in mind – that is, to be able to cope with changes happening in the climate now, and if necessary to be further adaptable to possible future extremes. This has implications for the design of building fabric and services.

3.4.1 Overheating & Ventilation

Summers are expected to be hotter in future, and so the risks associated with overheating in buildings are expected to increase – exacerbated by the Urban Heat Island (UHI) effect, where the concentration of buildings and hard surfaces in urban areas which absorb and retain heat can raise the temperature by several degrees relative to surrounding countryside. According to GLA / Climate London, projected increases in average monthly temperatures in London until 2050 show a 5-6°C increase in summer and winter averages, which will have an impact on health, infrastructure, comfort, and the operation of the city. The Committee on Climate Change estimates that the number of heat-related deaths is projected to increase from 2,000 per year in 2015 to 7,000 per year by the 2050s. Therefore, alongside a design focus on minimising the energy needed for space heating in winter, attention also needs to be paid to minimising overheating risks in summer.

The London Plan encourages developers to carry out robust overheating modelling for their proposals against extreme weather scenarios and design in appropriate mitigation measures. Developers are also recommended to make use of the GLA's London Climate Risk Map to identify whether their site is within an area of particular heat risk, which will need greater attention to mitigation.

The Cooling Hierarchy

Overheating risk should be addressed first through the design of buildings rather than through air conditioning, which will increase energy use and exacerbate the Urban Heat Island effect. Major development proposals should demonstrate through an energy strategy how they will achieve this, in accordance with the following cooling hierarchy:

FIRST PRIORITISE PASSIVE DESIGN PRINCIPLES:

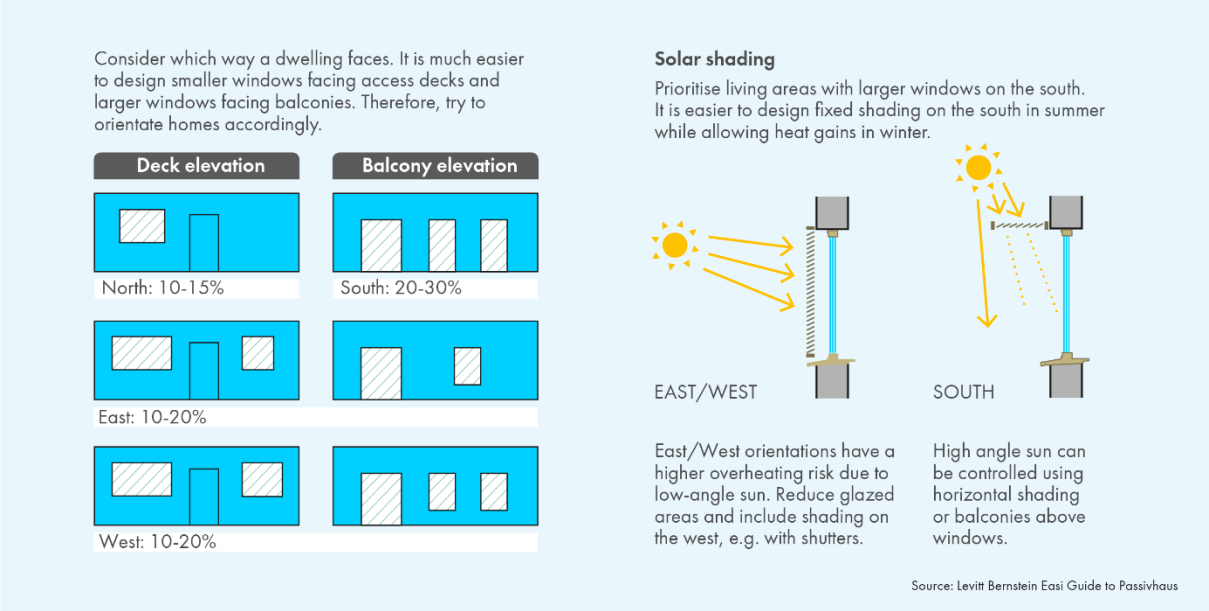
- **Minimise heat gains in summer** – this can be achieved through a variety of means, such as:
    - ***Thermal insulation*** – It is a myth that increasing insulation and airtightness cause overheating; well-insulated walls, floors, roofs, windows and doors will as effectively keep out heat in summer as they keep heat in in winter. As described above, minimising heat loss/gain is also facilitated by designing more compact and simpler forms; and avoiding breaks in the building envelope (thermal bridging) which can be a significant source of heat loss/gain.
    - ***Optimising orientation, glazing ratios and shading*** (from both fixed building elements and from green infrastructure) – as described in the Hounslow Character, Sustainability and Design Codes SPD (A2.34-39 - Passive Design), to balance minimising heat gain in summer with desirable passive heat gains in winter. See Window Area Guide below.
    - ***Low albedo surfaces*** to reduce heat absorption, and/or the provision of ***green roofs and walls*** which can have an insulating and cooling effect.
- **Minimise unwanted internal heat generation** through energy efficient design – e.g., minimising pipe-lengths for communal heating and limiting waste heat from appliances; these are often the cause of a build-up of heat in flats in summer.
- **Use internal thermal mass and high ceilings** to reduce temperature peaks within the building
- **Maximise passive ventilation –** manipulate building form and fabric to enable excess heat to be purged through cross ventilation, passive stack and wind driven ventilation:
    - All properties should be dual aspect to enable cross-ventilation.
    - Where possible, ventilation openings, gardens, balconies and outdoor amenity spaces should be positioned away from sources of air and noise pollution to ensure they can be used – further detail on how this can be achieved is set out in the Hounslow Character, Sustainability and Design Codes SPD (A2.232 - Mitigating Poor Air Quality; and A2.218-231 - Gardens and Balconies). The impact of noise, air quality and security on window-opening, particularly at night, will need to be taken into account very early on in design process.
    - Where this is not possible, provide winter gardens in preference to balconies on busy road frontages and under flight paths, where night-time noise is an issue.

THEN, HAVING MINIMISED THE NEED FOR COOLING THROUGH PASSIVE MEANS:

- **Provide whole-house mechanical ventilation** – where needed to ensure that buildings have good indoor air quality and are adapted for increased likelihood of heatwaves. Where used, MVHR units should be located on an external wall, to optimise their performance. Plant cupboards should be tightly planned and optimised, and separated from storage cupboards to ensure good access for maintenance and servicing.
- **Provide active cooling systems –** only where requirements CANNOT be met by other means. If modelling shows that a building passes an overheating assessment now but could be at risk during its lifetime under future weather files, even with all the above strategies deployed, consider including space (for plant, ducting, etc.) to facilitate future installation of efficient active cooling systems.

Window Area Guide

It is important to minimise heat loss to the north (smaller windows) while providing sufficient solar gain from the south (larger windows). Where this results in window sizes which seem ungenerous, use of architectural features such as stepped reveals or textured panels can improve the balance of solid to 'apparent' void.



Other measures which can help manage overheating risk include:

- Adjustments to internal layout – e.g., by locating living spaces in the warmest areas of the property (e.g., south-facing aspect), while protecting bedrooms from excessive afternoon heating (e.g., avoid west-facing windows).
- Providing the necessary space within homes near adequately sized, well-located windows to allow clothes to be dried naturally, thus removing the need for appliances which generate heat. (This will also reduce embodied carbon, energy use and the urban heat island effect.)

For homes that are predominantly mechanically ventilated, the CIBSE fixed temperature test must be followed.

Assessing Overheating Risk

The 2021 update to Building Regulations saw the introduction of a new Approved Document O on Overheating, which aims to limit unwanted solar gains in summer and provide adequate means of quickly removing excess heat from indoor environments. Compliance can be demonstrated through two methods:

1. The Simplified Method, under which the building must meet the acceptable design parameters for glazing, shading and ventilation set out in Approved Document O.
2. Where these parameters are too prescriptive, Dynamic Thermal Modelling may be used to demonstrate that a building nonetheless complies with limit overheating risk. This should be carried out at the detailed design stage.

For Method 2, the dynamic thermal model must satisfy a Chartered Institution of Building Services Engineers (CIBSE) overheating assessment, using the criteria set out in Approved Document O. Applicants should also note that, although internal blinds or external foliage such as trees would also help to reduce solar gain and are actively encouraged, they should not be taken into account when considering whether the overheating requirement has been met.

The CIBSE overheating assessments are contained in their guidance documents on assessing and mitigating overheating risk in new developments, which can also be applied to refurbishment projects. TM 59 should be used for domestic developments and TM 52 should be used for non-domestic developments. Assessments should be undertaken for all buildings where people will spend a significant amount of time – including any permanent or temporary residential accommodation, offices, healthcare and educational facilities.

For naturally ventilated homes, CIBSE TM59 sets two criteria for compliance. A dwelling that fails either of the criteria is deemed to be at unacceptable risk of overheating:

- Criterion A: Hours of Exceedance (living rooms, kitchens and bedrooms)
- Criterion B: Night hours above 26 °C (bedrooms only)

All rooms in the development will need to pass the relevant tests. In larger developments, those rooms identified as being most at risk should be selected for modelling and assessment – this choice will need to be justified and will include those with large / sun-facing glazing areas, top floor, less shading, single aspect and limited opening (e.g., ground floor). Where air quality, noise or crime concerns pose limitations to the opening of windows and cannot be mitigated, two separate overheating analyses should be submitted: one with openable windows and one with closed windows.

CIBSE Assessment Limitations – to be addressed in designs

Future Climate – The TM52 and TM59 methodologies do not include, as standard, assessments for expected future summer temperatures. CIBSE TM49 guidance and Design Summer Year (DSY) datasets should therefore also be used to ensure that all new development is designed for the climate it will experience over its design life. At a minimum, this should include the DSY2 (2003 –

very intense single warm spell) and DSY3 (1976 – prolonged period of sustained warmth) weather files. It is also recommended to include the 2050s and 2080s scenarios to demonstrate what mitigation measures might need to be incorporated in future. The GLA's Energy Planning Guidance provides further information on how these guidance documents and datasets should be used.

It is possible that developments which comply with TM59 now are unable to meet this requirement for future weather files over its design life, using passive techniques alone. Where dynamic modelling shows this to be the case, developments should be designed to be adaptable to future climate – e.g., by allowing space for plant and ducting needed to retrofit efficient mechanical cooling systems.

Window Control – assumptions on occupant behaviour in relation to window opening ONLY considers internal temperature – but this will be counterproductive if the outside temp is much hotter, or may not be desirable if there is night-time noise. Therefore, while TM59 may be used to demonstrate compliance, applicants are recommended to use modified assumptions for design purposes; e.g., sensible window control plus night-time purge only where this is feasible.

3.4.2 Reducing water use

Climate change is resulting in hotter, drier, summers with increased risk of drought. This results in reduced reliability of water supply, which – in combination with the challenge of a growing population and greater demand for water during hot spells – has led the Environment Agency to designate the Thames Water region to be "seriously water stressed" (Water Stressed Areas - Final Classification, 2021). Action is required now to ensure the availability of water for the future. It is therefore important that any new development does not lead to an overall increase in demand for water, as set out in the London Plan. For residential buildings, water use should achieve the RIBA 2030 Climate Challenge target for residential buildings and water consumption of <105 l/p/d.

This will be achieved by:

- Requiring all development to demonstrate that the use of mains water has been minimised by incorporating measures such as smart metering, water saving taps and appliances, and recycling measures
- Requiring all major developments and high water-use developments (such as hotels, hostels and student housing) to include water saving measures such as rainwater harvesting and greywater recycling to reduce mains water consumption.

Conserving water and energy go hand in hand. To reduce hot water-use in new developments:

- Reduce flow rates - 'Green' Euro Water Label should be used for water outlets (e.g.: certified 6 L/min shower head – not using flow restrictors).
- Reduce distribution losses - Maximum dead leg of 1 litre for hot water pipework. Tapping points (e.g., taps, shower connections) should be clustered near the hot water source.

3.5 Major Refurbishments

All existing buildings will need to decarbonise if we are to achieve net zero targets. Proposals for major renovations/refurbishments, changes of use, and extensions for major buildings should therefore use this as an opportunity to minimise operational energy use as far as practicable.

Any development involving the refurbishment, change of use or conversion of an existing building will not be required to offset the carbon shortfall. This is to disincentivise the demolition of retrofittable buildings and encourage their refurbishment, in order to minimise embodied carbon emissions from development.

However, all such development will be expected to maximise carbon savings onsite towards the net-zero carbon target. Building owners should adopt the approaches set out above to aim to achieve the same targets required for new construction, where technically, functionally and economically feasible, and taking embodied carbon into account (i.e., seeking to minimise whole-lifecycle emissions); or otherwise fully justify the solutions adopted. They will benefit from appointing a Retrofit Co-ordinator to prepare a bespoke Decarbonisation Plan, using a 'whole building' approach, to set the building on a pathway to zero carbon, with clear staged steps to get there.

Particular attention should be paid to:

- The building fabric – walls, roof and floor should be upgraded to be as close as possible to modern standards of thermal efficiency as is possible within the constraints of the planned refurbishment. Insulation should be selected according to the original building construction and materials – for example, breathable insulation will reduce the risk of moisture build-up in walls
- Location of uses with the building or site – if the scope of the refurbishment permits, consider adjusting the locations of different uses within the constraints of the existing structure to optimise the use of passive heating and cooling.
- If replacing the heating system – these should meet modern standards and avoid the use of fossil fuels, following the heating hierarchy set out in Section 3.3 above; connecting to a district heating system where possible, otherwise using a heat pump as the next best option.
- Windows and doors – where being replaced, high performance products should be selected, with windows preferably being triple-glazed. The sizing, shading and openability of new windows should be optimised to enable natural ventilation and reduce overheating risk, in line with advice above.
- Overheating risk – follow the cooling hierarchy above before replacing or installing a cooling system. Provision should also be made to ensure good indoor air quality, including natural ventilation where possible. An overheating assessment should be undertaken to ensure the building will remain usable for expected climate within its lifespan. Where this indicates an overheating risk for future weather files, developers should consider what measures could be retrofitted structurally into the development to mitigate this risk in dynamic thermal modelling.
- Installation of photovoltaic panels should be considered in all cases. Arrays can be installed over existing plant, integrated into existing roofs, alongside green roofs and on extensions. They can work efficiently on east- and west—facing elevations, as well as south-facing.
- Embodied carbon – work with a structural engineer to consider the benefits of alternative options for extensions and structural works
- Conservation areas and listed buildings – many of the above measures can be successfully integrated into heritage buildings. Early conversations with conservation officers are recommended to ensure that action towards net zero can be maximised without adversely impacting on the character, function and conservation of conservation areas or assets.

There are several retrofit standards which developers can follow – such as Enerphit for domestic projects, and BREEAM (refurbishment) for both domestic and non-domestic projects. Local Plan Policy EQ2 requires that major developments involving refurbishments should be assessed against BREEAM Domestic / Non-Domestic Refurbishments, and achieve a rating of Excellent as minimum.

FURTHER SOURCES OF ADVICE

Key GLA Strategies and Guidance

In addition to the London Plan, the GLA also plays a role in setting the policy context by publishing related guidance documents on best practice. The most relevant of these are listed below and, where relevant, referred to in the main text of this SPD:

- Energy Assessment Guidance 2018 – This document provides valuable information on preparing energy assessments in a planning submission
- 'Be Seen' Energy Reporting – see also accompanying guidance document
- London Environment Strategy 2018 – The London Environment Strategy sets a long-term vision for 2050 aimed at creating an integrated approach to improving London's environment, including in relation to climate mitigation and adaptation.
- Economic Development Strategy 2017 – This document sets out plans for a more inclusive economy, with measures for improving the environmental credentials of new buildings This document sets out plans for a more inclusive economy, with measures for improving the environmental credentials of new buildings
- London Heat Map
- London Building Stock Model

UK Government Regulations and Guidance

- Energy efficiency in buildings policy
- Building Regulations – Approved documents L1A, L1B, L2A, L2B (via the planning portal)

CIBSE (Chartered Institution of Building Services Engineers)

(Registration, membership or fee may be required for access):

- Introduction to Energy Efficiency (2012)
- CIBSE Guides – especially:
    - CIBSE Guide A: Environmental Design (2015)
    - CIBSE Guide B: Heating, Ventilating, Air Conditioning and Refrigeration (2001)
    - CIBSE Guide D: Transportation systems in buildings (2015)
    - CIBSE Guide F: Energy Efficiency in Buildings (2012)
    - CIBSE Guide M: Maintenance Engineering and Management (2014)
- CIBSE Knowledge Series – especially:
    - KS14: Energy Efficient Heating
    - KS11: Green Roofs
- Local targets for the UK are set out in this one-pager for EUI and space heating demand for different building types (in conjunction with LETI): CIBSE LETI Net Zero FAQs
- See also the Operational Net Zero Carbon Buildings Position Statement

Others

- Ofgem – Energy Company Obligation
- Carbon Trust - Low Carbon Buildings Guides
- Passivhaus (Widely used standard for low-energy heating and cooling)
- Levitt Bernstein Easi Guide to Passivhaus Design (2020)
- RIBA 2030 Climate Challenge - targets for architects (2021)
- LETI Climate Emergency Design Guide
- LETI Operational Energy Modelling Guide
- BRE's BREEAM Sustainability Standard
- Town and Country Planning Association – Sustainable Energy by Design: a TCPA 'by design' guide for sustainable communities
- Cost of Carbon Report (Haringey / London Boroughs – 2020)

GLOSSARY / KEY DEFINITIONS

Regulated energy: Energy consumed by a building, associated with fixed installations for heating, hot water, cooling, ventilation, and lighting systems.

Unregulated energy: Energy consumed by a building that is outside of the scope of Building Regulations, e.g. energy associated with equipment such as fridges, washing machines, TVs, computers, lifts, and cooking.

Operational carbon ($kgCO_2e$): The carbon dioxide and equivalent global warming potential (GWP) of other gases associated with the in-use operation of the building. This usually includes carbon emissions associated with heating, hot water, cooling, ventilation, and lighting systems, as well as those associated with cooking, equipment, and lifts (i.e. both regulated and unregulated energy uses).

Embodied energy: The total primary energy consumed (e.g. in MJ) from direct and indirect processes associated with the production of a product or system. This is considered within the boundaries of cradle-to-gate.

Upfront embodied carbon: The carbon emissions associated with the extraction and processing of materials, the energy and water consumption used by the factory in producing products, transporting materials to site, and constructing the building.

Embodied carbon (EC): The carbon emissions associated with the extraction and processing of materials and the energy and water consumption used by the factory in producing products and constructing the building. It also includes the 'in-use' stage (maintenance, replacement, and emissions associated with refrigerant leakage) and 'end of life' stage (demolition, disassembly, and disposal of any parts of product or building) and any transportation relating to the above.

Whole life carbon (WLC): This includes embodied carbon, as defined above, and operational carbon. The purpose of using WLC is to move towards a building or a product that generates the lowest carbon emissions over its whole life (sometimes referred as 'cradle-to-grave').

Primary energy: Primary energy is energy that has not undergone any conversion or transformation. As a common example, each kWh of grid electricity used in a UK building requires 1.5 kWh of primary energy; this accounts for the energy required for power generation (including fuel extraction and transport to thermal or nuclear power stations), transmission and distribution.

Circular economy: A circular economy is an industrial system that is restorative or regenerative by intention and design. It replaces the linear economy and its 'end of life' concept with restoration, shifts towards the use of renewable energy, eliminates the use of toxic chemicals and aims for the elimination of waste through the design of materials, products, systems that can be repaired and reused.

Energy Use Intensity (EUI): An annual measure of the total energy consumed in a building. It is a good indicator for building fabric performance as the metric is solely dependent on how the building performs in-use; rather than carbon emissions, which also reflect the carbon intensity of the grid. EUI is a metric that can be estimated at the design stage and very easily monitored in-use as energy bills are based on kWh of energy used by the building. This metric can be used to compare buildings of a similar type, to understand how well the building performs in-use. It includes all of the energy consumed in the building, such as regulated energy (heating, hot water, cooling, ventilation, and lighting) and unregulated energy (plug loads and equipment e.g. kitchen white goods, ICT/AV equipment). It does not include charging of electric vehicles. EUI can be expressed in GIA (Gross Internal Area) or NLA (Net Lettable Area).

ANNEX A

Policy and Legislative Context

A1 Overview

This Annex sets out the international and national policy context and legislation on climate change which may be relevant to planning decisions in London Borough of Hounslow. The guidance contained within this document draws on this context and interprets it for development within the Borough. The policies set out below will, where relevant, and appropriate, be taken into account when considering planning applications made to the Council.

A2 International Policy Context

The threats of human-induced climatic change have become a growing area for policy research in the past few decades, rising to the forefront of global and national policy agendas as the research base has become increasingly extensive and convincing, and the impacts have started to present themselves.

From the first United Nations Framework Convention on Climate Change (UNFCCC) back in 1992, which aimed to prevent 'dangerous' human interference with the climate system, the breadth of global policy seeking to adapt to and mitigate against anthropogenic climate change has advanced, with the Kyoto Protocol of 1997 setting legally binding emission reduction targets and the Paris Agreement of 2015 requiring countries to work together to keep the global average temperature increase well below 2 degrees above pre-industrial levels, and ideally limited to 1.5 degrees. A further summit held in 2019 (the Climate Action Summit) identified key sectors where differences can be made to minimise impacts, which include cities and energy supplies.

The evidence base underpinning is provided in regularly updated assessments published by the International Panel for Climate Change (IPCC), whose latest (5th) report was published in 2014, demonstrating categorical evidence of human-driven climate change. Its 6th report is due out in 2022 (following publication of The Physical Science Basis report in August 2021).

A3 EU Level

At the European Union (EU) level, the EU's climate change programme has committed to cut emissions across the bloc by 80-95% by 2050 compared to 1990 levels. To this end, the EU's Adaptation Strategy (2013) has three objectives: (1) promoting action by member states (i.e. to develop mitigation strategies and build up adaptation capacities); (2) 'climate proofing' action at the EU level; and (3) Better-informed decision-making (to address gaps in existing knowledge and inform all sectors of how they can act).

Though the United Kingdom has left European Union, it is likely that a policy agenda similar to that required by EU member states will be imposed in the UK. At any rate, tackling climate change will require joined-up action between the UK and its neighbours so it is valuable to understand the EU policy context.

A4 National Policy Context

The challenge of tackling climate change is addressed at all levels of planning policy in the UK.

In light of growing public awareness about the impacts of climate change, a 'climate emergency' was declared by the UK Government in May 2019, following a surge in national and international attention. Though not legally binding, this signalled the will of parliament to act on the issue, and shortly after 261 Councils across the country followed suit in declaring their own local climate emergencies (including Hounslow Council). In response, authorities will be expected to set ambitious targets and find innovative ways of responding to climate change, within the means and regulations of national, regional and local policy. Pursuant to this, on 27 June 2019 the UK Government became the first major economy in the world to pass laws to end its contribution to global warming by 2050.

The sub-sections below cover very briefly some of the historic policy context underpinning the NPFF and contemporary climate change policy.

A5 Historical Legislative Context

Planning and Compulsory Purchase Act 2004 (as amended by the 2008 Planning Act)

The PCPA sets the structure of the local planning framework in England and was the first piece of legislation to formally introduce a legal duty requiring plan-making authorities to include policy aimed at mitigating and adapting to climate change. Section 19(1A), as amended by the Planning Act 2008, requires that 'Development plan documents must (taken as a whole) include policies designed to secure that the development and use of land in the local planning authority's area contribute to the mitigation of, and adaptation to, climate change.' When combined with other legal and policy requirements relating to climate change, Section 19 represents a strong foundation for climate action through plan-making.

Climate Change Act 2008

The *Climate Change Act 2008* (CCA) introduced an ambitious statutory target of bringing CO_2 emissions down to at least 80% below 1990 levels by 2050 (with interim five-yearly carbon budgets of 37% by 2020, 51% by 2025 and 57% by 2030); it also established a framework for the ongoing reporting of climate change risks in England and how Government funding has been used to tackle and adapt to these impacts. The CCA (in conjunction with reports published in its wake) therefore serves as a key evidence base for identifying risks and priorities for action and adaptation. The CCA has subsequently been updated by the *2008 Act (2050 Target Amendment) Order 2019* which amends the statutory target to 100% reduction in emissions (or 'net zero') by 2050.

Planning Act 2008

This Act introduced a new planning regime to regulate large-scale, 'Nationally Significant' infrastructure projects. To guide decisions on such projects, the Government has produced National Policy Statements (NPS), which LPAs have a duty to apply when determining major renewable energy applications.

Planning and Energy Act 2008

The Planning and Energy Act 2008 was amended in 2015 to provide Government with powers to stop local planning authorities from being able to exceed the minimum energy efficiency

requirements of the Building Regulations. A written ministerial statement in the same year set out an expectation that local planning authorities should not set energy efficiency standards for new homes higher than the energy requirements of Level 4 of the Code for Sustainable Homes (equivalent to a 19% improvement on the Part L 2013 standard). The Government has so far not commenced this amendment, causing confusion and uncertainty amongst LPAs and developers. In order to address this, the Government clarified their position through the Future Homes Standard consultation response (January 2021) by stating that it would not amend the Planning and Energy Act 2008. As such local planning authorities still retain powers to set local energy efficiency standards for new homes through local plan policy

The PEA also introduced the ability for LPAs to require that a proportion of the energy demand for new developments is generated locally, within the vicinity of a development, via renewable or low-carbon technologies. This approach can be used to promote area-based solutions such as district heating, which can form part of a lucrative zero-carbon policy whereby local communities and planning authorities are able to reap benefits from localised renewable energy production.

In this context, it is helpful to note that the Council initiated work in early 2022 to prepare a heat map and energy masterplan for the borough. This will be used to identify areas where we will expect developers to connect new developments to proposed heating networks to support their development – see Chapter 5 for more information.

This approach will be further supported by the government's commitment in the 2020 Energy White Paper to implement heat network zoning by 2025, on which BEIS launched a consultation in October 2021. This would involve designating areas within which heat networks are the lowest cost, low carbon solution for decarbonising heating. Within a zone, certain types of building would be required to connect to their local heat network in a given timeframe.

Localism Act 2011

The Localism Act catalysed radical reforms to the planning system, which the Government saw as key to meeting climate change obligations. At the local level, the Act encouraged increased transboundary 'co-operation' between councils when adapting and mitigating to climate change, and facilitated community action on climate change through the development of Neighbourhood Development Plans and Neighbourhood Development Orders. However, perhaps more importantly, it laid the foundation for a new National Planning Policy Framework. This is explored in the next section.

ANNEX B

Sustainability Checklist

The checklist below sets out requirements and expectations of new development coming forward, under a number of key sustainability themes. Following consultation, it will not form part of the SPD but will be integrated, in a usable form, into the council's validation list requirements for planning application.

For each measure, up to three levels are defined as set out below:

MINIMUM REQUIREMENT / LOW ASPIRATION	MEDIUM STANDARD or ASPIRATION	HIGH STANDARD or ASPIRATION
Meets minimum requirements only (e.g., Building Regulations); or, where no such requirements are defined, represents a low level of aspiration – not consistent with achieving climate targets	A higher standard or aspiration, compatible with Net Zero Carbon and Net Zero Waste by 2050	An exemplary standard, which – where relevant – is in alignment with our Climate Declaration target for Net Zero Carbon and Net Zero Waste by 2030

Where numerical standards are set out in the checklist, they have been based on the following sources:

- Minimum energy performance requirements relate to the Target Fabric Energy Efficiency reference values in SAP 10.2 (Appendix R), where available
- Other energy performance standards are based on assumptions for 'Business as Usual', 'Good Practice' and 'Ultra Low Energy' specifications in the Towards Net Zero Carbon 2023 Update Report or (where not available there) from LETI's Climate Emergency Design Guide (2020).
- Other numerical standards are set with reference to GLA targets, e.g. in relation to the circular economy. Aspirational targets are based on those proposed by organisations such as LETI or UKGBC, or by other local authorities in similar guidance (e.g. Epping Forest District Council Sustainability Guidance)
- Qualitative standards relate to the good practice guidance set out in this SPD

Applicants will be expected to:

- Complete the sustainability questions under each of the themes relevant to their project, indicating the proposal's expected performance against key measures, such as for carbon reduction. Applicants are strongly encouraged to consider these measures early in the design process, and should be prepared to discuss the measures at the pre-application stage
- Submit a completed checklist, as part of the Council's wider validation requirements, alongside their applications. Outline planning applications will need to complete only those questions marked for them. **Attention to the requirements set out in these checklists will facilitate smoother progress of proposals through the development management process.**

Passive Design (See *Character, Sustainability & Design Codes SPD*, A2.34-39)		MINIMUM REQUIREMENT / LOW ASPIRATION	MEDIUM STANDARD OR ASPIRATION	HIGH STANDARD OR ASPIRATION
PD.1	Site planning and building orientation takes advantage of useful natural light, ventilation and solar gains, while also minimising internal heat gain and the impacts of the urban heat island in the summer.			☐
PD.2	Optimised glazing ratios and shading devices to reduce heating demands in winter, while reducing risk of overheating in summer. The need for moveable external shutters should be avoided due to the expense of installation and maintenance.			☐
PD.3a	Form Factor (small-scale housing)	2.5 ☐	2.4-1.7 ☐	1.7 ☐
PD.3b	Form Factor (med/large scale housing)	1.5 ☐	1.4-0.8 ☐	<0.8 ☐

Circular Economy (See *Character, Sustainability & Design Codes SPD*, A2.52-64)		MINIMUM REQUIREMENT / LOW ASPIRATION	MEDIUM STANDARD OR ASPIRATION	HIGH STANDARD OR ASPIRATION
GLA REQUIREMENTS				
CE.1	Percentage of demolition waste materials (non-hazardous) diverted from landfill for reuse, recycling or recovery	95%		100
CE.2	Percentage of excavation waste materials (non-hazardous) diverted from landfill for beneficial reuse	95%		100
CE.3	Percentage of construction waste materials diverted from landfill for reuse, recycling or recovery	95%		100
CE.4	Percentage of the building material elements to be comprised of recycled or reused content	20%	30%	40%
CE.5	Circular Economy Statement has been completed			☐
ASPIRATIONAL TARGETS				
CE.6	How much of the materials used on site are sourced from ethical and responsible supply chains?	80%	95%	100%
CE.7	How much of the materials used are non-hazardous?			100%

CE.8	How much of the materials used can be easily extracted, recycled, and manufactured?	80%	90%	95%
CE.9	To what amount are the new buildings circular-by-design?	20%	40%	65%
CE.10	How much of the materials used are 'reusable' (I.e., can be economically disassembled and reused on future buildings)?			80%

Embodied Carbon (See *Character, Sustainability & Design Codes SPD*, Section A2.33, A2.52-64)			**MINIMUM REQUIREMENT / LOW ASPIRATION**	**MEDIUM STANDARD OR ASPIRATION**	**HIGH STANDARD OR ASPIRATION (LETI 2020 target)**
EC.1	Embodied Carbon – product and construction (A1-5) ($kgCO_2e/m^2GIA$)	Residential	<850	675	<500
		Offices	<950	775	<600
		Retail	<850	700	<550
		Education	<750	625	<500
	Embodied Carbon –maintenance, replacement, repair and end of life (B1-5, C1-4, incl. Sequestration) ($kgCO_2e/m^2GIA$)	Residential	<350	325	<300
		Offices	<450	405	<370
		Retail	<200	170	<140
		Education	<250	210	<175
EC.2	GLA Whole Life-cycle Carbon Assessment Template has been completed to the relevant stage				☐

NB: LETI have identified a range of embodied carbon standards, in bands from G (lowest) to A++ (highest) in Climate Emergency planning policy guidance. The 'low aspiration' targets in this checklist are equivalent to Band E, 'medium aspiration' is Band D, and 'high aspiration' is Band C, which they have set as the 2020 Best Practice standard in their Climate Emergency Design Guide (2020). Bands B and above identify possible future aspirational targets for embodied carbon - for example, RIBA have proposed Band B as the 2030 target, and LETI propose Band A as the 2030 target.

Operational Energy (Domestic) (See *Climate Change Mitigation and Adaptation SPD*, Chapter 3)	**MINIMUM REQUIREMENT / LOW ASPIRATION**	**MEDIUM STANDARD OR ASPIRATION**	**HIGH STANDARD OR ASPIRATION**
FABRIC EFFICIENCY & DEMAND REDUCTION			

OE.1	**Operational Energy Use Intensity** (kWh/m^2/y) (includes both regulated and unregulated energy use in the building, as measured at the meter)	<75	<55	<35
OE.2	**Space Heating Demand** (kWh/m^2/y)	<40	<25	<15 (<20 for detached, semi-detached and end-of-terrace homes)
OE.3	On-site reduction in CO_2 emissions against Building Regulations Part L 2021 (incl. renewables)	35%	50%	80%
OE.4	Air Permeability (m^3/m^2/hr @ 50Pa)	5	3	1
OE.5	Ventilation Strategy	Natural (with extract fans)	MVHR (85% efficiency)	Openable windows with cross-ventilation, plus MVHR (90% efficiency; <2m duct length to external wall)
OE.6	Floor U-Value (W/m^{2}K)	0.13 (FEES)	0.10	0.08
	External Walls U-value (W/m^{2}K)	0.18 (FEES)	0.15	0.11 (house) 0.10 (low-rise) 0.13 (mid/high-rise)
	Roof U-value (W/m^{2}K)	0.11 (FEES)	0.11	0.10
	External doors U-value (W/m^{2}K)	1.0 (FEES)	1.0	1.0
	Windows (and doors with >60% glazed area) U-value (W/m^{2}K)	1.2 (FEES)	1.0	0.80 (low/mid-rise) 0.90 (high-rise)
OE.7	Windows g-value	0.6 (house) 0.4 (other)	0.6 (house) 0.5 (other)	0.6 (house) 0.5 (other)
OE.8	Thermal Bridging y-value (W/m^{2}K)	0.1	0.07	0.04
OE.9	Percentage of household electricity provided by on-site renewable technology	>35%	>50%	100%
OE.10	Predicted annual renewable energy generation (kWh/m$^2_{footprint}$.yr)	No PV	Some PV, but not maximised	100 **Low-rise:** meets 100% of annual requirement

				Med/high rise: covers 70% of roof area
OE.11	Dead leg of hot water pipework (pipe volume)			<1 litre
OE.12	'Green' Euro Water Labels used for all hot water outlets (e.g.: certified 6 L/min shower head – not using flow restrictors)			YES

Climate Adaptation (Domestic) (See *Climate Change Mitigation and Adaptation SPD*, Chapter 3)		**MINIMUM REQUIREMENT / LOW ASPIRATION**	**MEDIUM STANDARD OR ASPIRATION**	**HIGH STANDARD OR ASPIRATION**
CA.1	Has an appropriate overheating assessment or modelling been provided, as recommended in the London Plan?			YES
CA.2	A statement to be provided demonstrating that the following maximum glazing ratios (as a % of wall area) have been met, and appropriate external shading has been provided: • North aspect 10-15% • South aspect 20-25% • East aspect 10-15% • West aspect 10-15%			YES
CA.3	Potable Water: expected internal water use (litres/person/day)	105	95	75
CA.4	water collection or recycling measures used	water butts installed to all suitable properties	Rainwater harvesting systems	Grey water recycling & harvesting

Operational Energy (Non-Domestic) (See *Climate Change Mitigation and Adaptation SPD*, Chapter 3)		**MINIMUM REQUIREMENT / LOW ASPIRATION**	**MEDIUM STANDARD OR ASPIRATION**	**HIGH STANDARD OR ASPIRATION**
ND.1	What BREEAM rating is the development targeting?	Excellent		Outstanding
ND.2	**Operational Energy Use Intensity** (kWh/m^2/y) (in GIA)	<105 (Office) <95 (School) <50 (Industrial) <225 (Hotel)	<85 (Office) <75 (School) <40 (Industrial) <200 (Hotel)	<70 (Office) <65 (School) <35 (Industrial) <160 (Hotel)
ND.3	**Space Heating Demand** (kWh/m^2/y)	<25 (Office) <35 (School) <20 (Industrial) <30 (Hotel)	<15 (Office) <15 (School) <15 (Industrial) <25 (Hotel)	<5 (Office) <5 (School) <10 (Industrial) <15 (Hotel)

ND.4	On-site reduction in CO_2 emissions against Building Regulations (Part L 2021 – incl. renewables)	35% (NB: London Plan requirement - but GLA acknowledges difficult to achieve for some typologies)	Recent research suggests the following good practice minima: 20% (Office) 40% (School) 45% (Industrial) 10% (Hotel)	60%
ND.5	Air Permeability ($m^3/m^2/hr$ @ 50Pa)	5	3	1 (2 for industrial)
ND.6	Ventilation System	Standard Quality AHU with HR / fan-assisted ventilation	Good quality AHU with HR / MVHR	Best practice AHU with HR / MVHR
ND.7	Floor U-value (W/m^2K)	0.15	0.12	0.09
	External Walls U-value (W/m^2K)	0.25	0.18	0.13
	Roof U-value (W/m^2K)	0.15	0.13	0.10
	Windows U-value (W/m^2K)	1.6	1.3	1.0
	Windows g-value	0.4 - 0.5	0.4 - 0.5	0.4 - 0.5
	External doors U-value (W/m^2K)	2.0	1.5	1.2
	Thermal Bridging y-value (W/m^2K)	Good practice (5% of losses)	Better practice (3% of losses)	Best practice (1% of losses / 0.04)
ND.8	What is the Potable Water Use designed for? (Litres/person/day)	16 l/p/d	13 l/p/d	10 l/p/d

Waste management (See *Character, Sustainability & Design Codes SPD*, Waste and Recycling – A2.123-132; *Hounslow Recycling and Refuse Guidance*)		**MINIMUM REQUIREMENT / LOW ASPIRATION**	**MEDIUM STANDARD OR ASPIRATION**	**HIGH STANDARD OR ASPIRATION**
Wa.1	Has early engagement been undertaken with the Council's Waste Management team to ensure their processes are taken into consideration?	No, LPA not engaged.		Yes, demonstrated
Wa.2	Have developments been designed to encourage ease in waste recycling?'			Yes

Wa.3	How much municipal waste (operational waste) will be recycled or composted (vs sent to landfill or energy recovery?)			65%
Wa.4	Percentage of biodegradable and recyclable waste which will be diverted to landfill			0
Wa.5	KERBSIDE COLLECTION: Distance of waste and recycling storage from entrance to premises			3m
Wa.6	KERBSIDE COLLECTION: Distance from waste and recycling storage to vehicle access			10m
Wa.7	COMMUNAL COLLECTION: Distance from home to collection point			30m

Green and Blue Infrastructure (See *Character, Sustainability & Design Codes SPD*, Nature – A2.133-180)		**MINIMUM REQUIREMENT / LOW ASPIRATION**	**MEDIUM STANDARD OR ASPIRATION**	**HIGH STANDARD OR ASPIRATION**
GB.1	Has a high-quality landscape-led approach been demonstrated as set out in the Council's Green & Blue Infrastructure Strategy?	No	Some landscape analysis undertaken	Ecology, topography, vistas, character & features driving design
GB.2	What % of Biodiversity Net Gain does your development achieve? (Environmental Bill requires min. 10%)	10% BNG	11-20% BNG	20%+ BNG
GB.3	Does the Ecology report show process of mitigation and location hierarchy, with Stewardship and Maintenance strategy provided for green infrastructure and BNG?	No strategy	Outline strategy provided	30-year strategy with input from community
GB.4	Have play, community amenity and food production opportunities been proposed? Fields in Trust distances should be followed for play spaces.	No	Yes - locations mapped with walking isochromes	Yes - locations mapped, characters defined, strategies for play / food / active frontages
GB.5	Has multifunctional urban greening been incorporated at different scales, as a fundamental element of site and building design, in line with Urban Greening Factor (UGF) target scores set in London Plan / adopted by LB Hounslow?	0.4 (Residential) 0.3 (Non-residential)	0.4 - 0.6 (Residential) 0.3 - 0.5 (Non-residential)	>0.6 (Residential) >0.5 (Non-residential)

GB.6	Proportion of external space in the development and conveyance systems which will be permeable (i.e., permeable paving, soakaways, swales, rain gardens, streams, ponds/ wetlands)	50%	75%	100%
GB.7	Will the development follow the drainage hierarchy set out in London Plan policy SI 13 in order to achieve greenfield run-off rates?	Yes	Yes - achieves greenfield runoff rates, or maximum of 2l/s, for application site	Yes - achieves greenfield run-off rates for wider site in developer's ownership (i.e., including any parts of the site or existing development not included in application)

Sustainable Movement (See *Character, Sustainability & Design Codes SPD*, Movement – A2.79-120)		**MINIMUM REQUIREMENT / LOW ASPIRATION**	**MEDIUM STANDARD OR ASPIRATION**	**HIGH STANDARD OR ASPIRATION**
Tr.1	Have walkable, low-traffic and permeable neighbourhoods been designed as a first principle?	No - vehicle access design prioritised	Transport hierarchy considered	Yes - walking & cycling desire lines, network, topography, user hierarchy as design drivers
Tr.2	Have safe and high-quality connections to active travel networks beyond the development boundary been proposed with Green Infrastructure (GI) considered?	Ongoing connectivity not considered	Some connectivity - lacks GI consideration	Strong connections to networks, with clear relationship to GI
Tr.3	Have inclusive design principles / accessibility for all regarding sustainable movement been achieved?	Meets Equalities Act	Inclusive Design Statement provided	Exemplary inclusive design provided
Tr.4	Has cycle parking been designed to be high quality, safe, secure and easy to access?	Cycle parking not provided	Suitable quantity of spaces provided	Suitable quantity and high-quality environment provided
Tr.5	Has a high-quality transport assessment been undertaken?	Yes - assessment undertaken		Yes - qualitative assessment undertaken

Tr.6	Has a thorough Sustainable Travel Plan been provided?	Sustainable Travel Plan provided		STP includes behaviour change programme, travel coordinator, monitoring
Tr.7	Has provision been made [in major developments] for consolidation of deliveries?	No		Yes