

**Northumberland Development Project Hotel S73
Application
Energy Strategy Addendum**

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1 Executive Summary

This Energy Strategy Addendum has been prepared on behalf of Tottenham Hotspur Property Company Limited ("the Applicant"), in support of an application for minor material amendments to the London Borough of Haringey (LBH) made under Section 73 (S73) of the Town and Country Planning Act 1990 (as amended), following the grant of planning permission for the Northumberland Park Development ("the Site") on 15 April 2016 ref HGY/2015/3000.

This report is an Addendum to the original Energy Strategy that was produced for the NDP permission in 2015. It applies to Plot 3 only (the hotel building) and addresses any updates to policy and design since the original application. This document has been prepared in alignment with GLA guidance "Greater London Authority guidance on preparing energy assessments (2022)" and other accompanying documentation from both the GLA and the London Borough of Haringey.

The carbon emissions results for each stage of the London Plan energy hierarchy have been collated in the format required for the planning submission, using the latest version of the GLA's Carbon Emissions Reporting Spreadsheet V2.0. The following results outline the predicted carbon emissions for the site:

Table 1—1 Table showing the estimated carbon reductions at each stage of the energy hierarchy (Part L 2021) – site-wide

	Total regulated emissions (Tonnes CO₂ / year)	CO₂ savings (Tonnes CO₂ / year)	Percentage savings (%)
Part L 2021 baseline	130.3	n/a	n/a
Be lean	108.8	21.6	17%
Be clean	66.5	42.2	32%
Be green	68.9	-2.3	-2%
Total Savings	-	61.4	47%
Off-set		2,066.7	

The façade has been informed through direction from the overheating analysis. It can be seen from the modelling that with an unconstrained façade the building complies with the CIBSE TM59 criteria throughout all sample rooms assessed. However, acoustics constraints due to event day noise break-in has resulted in mechanical cooling being required.

2 Introduction

This Energy Strategy Addendum has been prepared on behalf of Tottenham Hotspur Property Company Limited (“the Applicant”), in support of an application for minor material amendments to the London Borough of Haringey (LBH) made under Section 73 (S73) of the Town and Country Planning Act 1990 (as amended), following the grant of planning permission for the Northumberland Park Development (“the Site”) on 15 April 2016 ref HGY/2015/3000.

The NDP permission is a ‘hybrid consent’ (“the Hybrid Consent”) which comprises of: full planning permission for Plot 1 (The Stadium), Plot 2 (The Tottenham Experience) and Plot 3 (Hotel); and outline planning permission for Plot 4 (The Extreme Sports Building), Plot 5 (The Residential Buildings and Flexible B1/D1 Space) and Plot 6 (The Community Health Building). This S73 Application proposes amendments focusses on Plot 3 which has already been commenced up to ground level, including foundations and the basement car park.

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Figure 2—1 The proposed development

This S73 application seeks to enhance the deliverability of the proposals and respond to the evolving regeneration of the surrounding area.

The changes to the Plot 3 hotel building relate to:

- Changes to the building form and layout Increase to the height of the building from 23 to 29 storeys
- An increase in the site wide hotel floorspace to 16,132 m²
- A change to the residential floorspace within Plot 3 with no overall increase across NDP as a whole

The proposed description of development is as follows:

“Application under Section 73 of the Town and Country Planning Act for variations to Condition A4 (Consented Drawings and Documents) and Condition A7 (Maximum Quantity/Density) of the hybrid planning permission HGY/2015/3000 (as amended) for the proposed demolition and comprehensive redevelopment of the Northumberland Park Development Project (the amendments consist of revisions to the design, height and maximum floorspace at Plot 3 Hotel and other changes).”

The following images show the typical floor plans of the hotel levels and the residential levels and are used to give the energy officer context of the scheme.



Figure 2—2 Typical hotel floor plan (Levels 2 to 10)

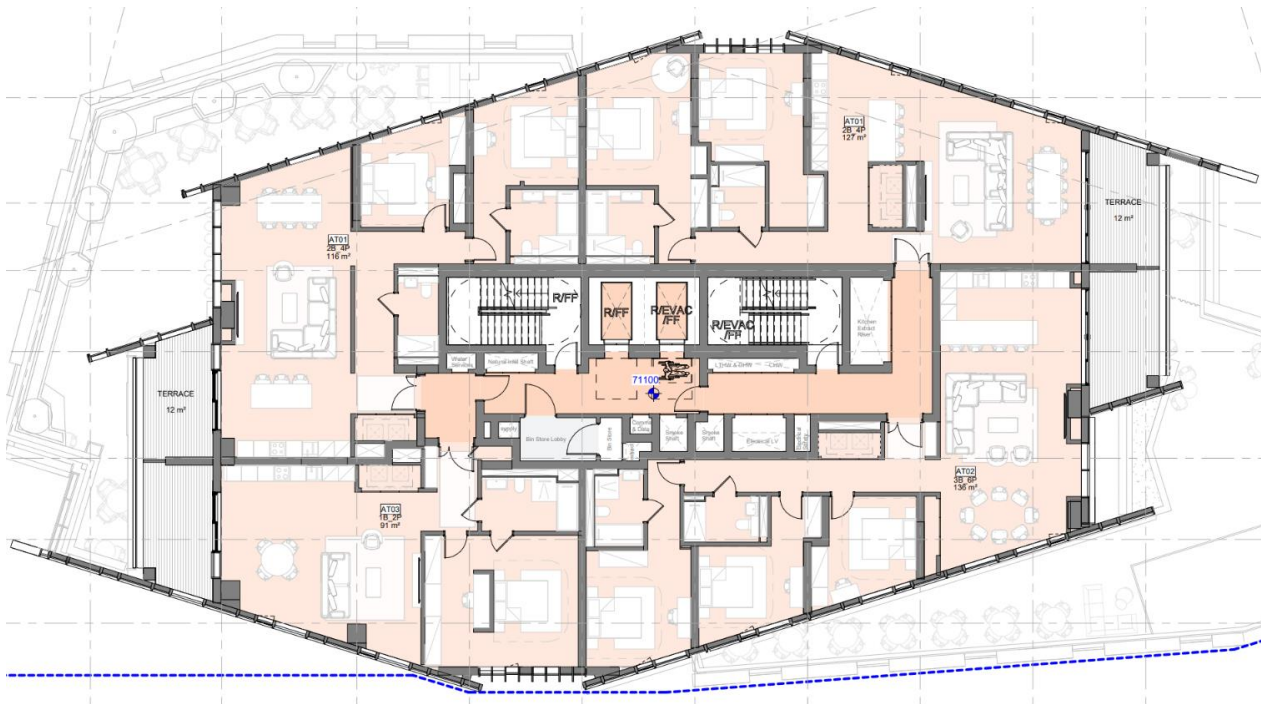


Figure 2—3 Typical residential floor plan (Levels 14 to 18)

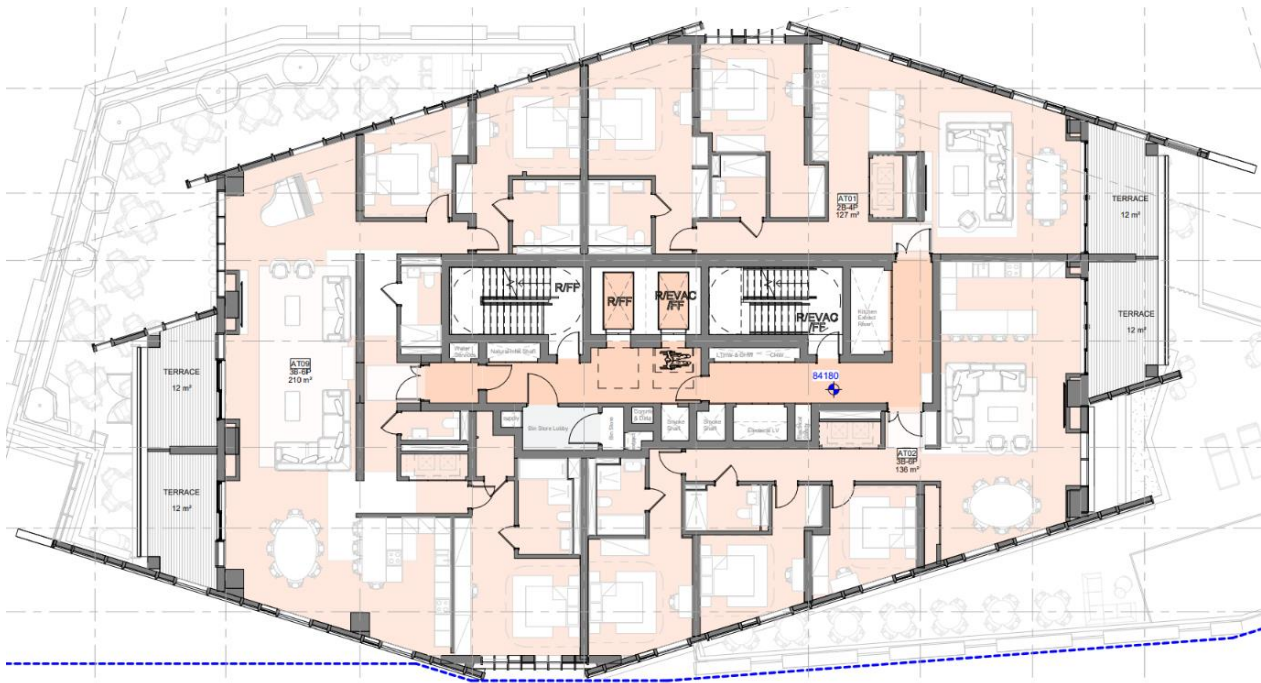


Figure 2—4 Typical residential floor plan (Levels 19 to 25)

3 Energy Policy and Drivers

This section the key national, strategic and local policy frameworks relating to energy, carbon and sustainability, as well as standards set by the Applicant. As the NDP was granted consent in 2016 and the hotel since implemented, the policies and targets have changed since then. Therefore, the most up-to-date policy and drivers are covered in this section.

The Site is located in the London Borough of Haringey (LBH) and as such any development proposal will be determined against the following documents:

- LBH Strategic Policies 2013 (with alterations adopted July 2017) ("SP")
- LBH Development Management DPD (adopted July 2017) ("DM DPD")
- Site Allocations DPD (adopted July 2017) ("SA DPD")
- Tottenham Area Action Plan (adopted July 2017) ("TAAP") –
- London Plan (March 2021) ("LP")

National Planning Policy Framework ("NPPF") (July 2021) and accompanying Planning Practice Guidance ("PPG") are the principle material considerations in this case, alongside various Supplementary Planning Guidance/Documents ("SPDs/SPGs").

3.1 National Energy Policy and Guidance

3.1.1 The United Nations Paris Climate Agreement

The Paris Agreement is a major international climate action agreement to which the UK is a signatory. The 196 countries under the agreement have committed to limiting global warming to 2°C over pre-industrial levels and aim to safely adapt to any consequences of climate change. The UK ratified this in 2016.

While countries may set their own policies and targets (NDCs), these are assessed as to their level of ambition and to their progressive approach and must be tracked and published. The UK currently falls under NDCs produced collectively with the European Union. These commit to at least a 40% domestic reduction in Greenhouse Gas (GHG) emissions by 2030 compared to 1990 Climate Analysis Indicators Tool (CAIT), including energy consumption and industrial processes. Though this calculation may change in light of Brexit, the UK will remain signatory to the Paris Agreement, with its NDC revised.

3.1.2 The National Planning Policy Framework (July 2021)

The NPPF sets out the Government's planning policies for England and how these are expected to be applied. A greater focus is now placed on the dissemination of energy policy within regional development frameworks.

Within the NPPF's planning guidance relating to energy is set out in section 14 – "meeting the challenge of climate change, flooding and coastal change".

Additionally, paragraphs 7 and 8 of the NPPF highlight that the purpose of the planning system is to contribute to the achievement of sustainable development, which has the following three overarching objectives:

- *"an economic role – to help build a strong, responsive and competitive economy..*
- *a social role – to support strong, vibrant and healthy communities, by ensuring that a sufficient number and range of homes can be provided to meet the needs of present and future generations...*
- *an environmental role to contribute to protecting and enhancing our natural, built and historic environment...*

The NPPF is underpinned by a presumption in favour of sustainable development. Paragraph 11 of the NPPF states that decisions should apply a presumption in favour of sustainable development and approve development proposals that accord with an up-to-date development plan without delay.

Paragraphs 81 and 83 of the NPPF are also relevant. These require policies and decisions to create the conditions for businesses to invest and expand, support economic growth and allow areas to build on their strengths.

3.1.3 Climate Change Act

The Climate Change Act 2008 established a legally binding target to reduce the UK's greenhouse gas emissions by at least 80% below 1990 levels by 2050. To drive progress and set the UK on a pathway towards this target, the Act introduced a system of carbon budgets which provide legally binding limits on the amount of emissions that may be produced in successive five-year periods, beginning in 2008.

The first three carbon budgets were set in law in May 2009 and require emissions to be reduced by at least 34% below base year levels in 2020. The fourth carbon budget, covering the period 2023–27, was set in law in June 2011 and requires emissions to be reduced by 50% below 1990 levels. The fifth carbon came into force in July 2016, limiting the budget for 2028–2032 of is 1,725 mega tonnes of carbon dioxide equivalent. This correlates to the reduction of 57% in greenhouse gas emissions compared to 1990 levels.

3.2 UK decarbonisation context

The UK became the first major economy in the world to pass laws to end its contribution to global warming by 2050. The target will require the UK to bring all greenhouse gas emissions to net zero by 2050, compared with the previous target of at least 80% reduction from 1990 levels.

Electricity grid decarbonisation

The carbon intensity of electricity in the UK has been reducing from 0.519 kg CO₂/ kWh to 0.233 kg CO₂/ kWh as per SAP methodologies 2012 and SAP 10. This is due to the closure of coal fired power stations and the increase in renewable energy. As a result, electricity is becoming a more feasible lower carbon fuel source compared to traditional gas combustion. This is also resulting in gas fired combined heat and power (CHP) engines not providing the long-term carbon savings shown previously and going forward CHP will be a high carbon technology based on Part L. These changes result in a difference in Part L carbon reductions shown by recent developments and for new ones coming forward now.

London Plan Policy is looking to push towards the future of low carbon heating, with the application of heat pumps, and therefore the GLA ask for the SAP 10 carbon factors to be used as these provide the most accurate representation of the latest carbon intensity of the grid.

3.3 Policy and Regulation Changes

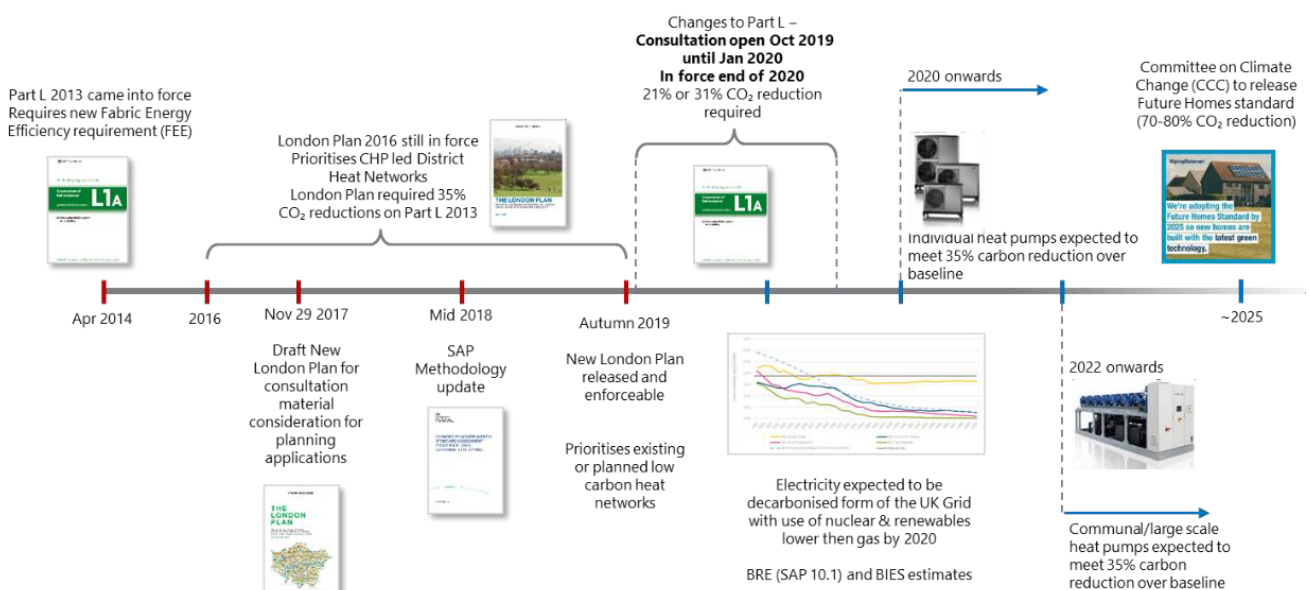


Figure 3—1 UK past and future energy and carbon regulations

Figure 2—2 shows the changing policy and regulatory landscape since 2014. The Future Homes Standard was consulted upon in 2020. No further updates on the process have been provided to date. It was outlined by BEIS that district heat networks (DHN), heat pumps and electric heating, along with improved fabric will meet these future emissions reductions targets. The consultation report stated:

“2.9 The CCC stated in its report Net Zero: The UK's contribution to stopping global warming that achieving the net zero target will require the full decarbonisation of buildings by 2050. There are a number of existing low carbon heating technologies with the potential to support the scale of change needed. We anticipate that low carbon heating may be delivered through heat pumps, heat networks and in some circumstance's direct electric heating.”

3.3.1 Building Regulations Part L 2021

Part L of the 2021 Building Regulations relates to the Conservation of Fuel and Power in both new construction dwellings (Part L1) and non-domestic buildings (Part L2). These documents stipulate a minimum level of efficiency that buildings must be constructed to. The guide to the regulations (Approved Documents) must be read in conjunction with other supporting documents, such as the National Calculation Methodology (NCM) Modelling Guide 2021.

Compliance with these regulations is demonstrated through thermal modelling analysis. For domestic buildings this is demonstrated through SAP (Standard Assessment Procedure calculations) and for non-domestic buildings dynamic simulation energy modelling or SBEM (Simplified Building Energy Model) is required.

The proposed hotel building comprises self-contained domestic dwellings therefore Part L 1 applies here. For everything else, Part L 2 applies. Therefore, two separate energy models have had to be created and analysed.

3.4 Regional Planning Policy

3.4.1 The London Plan (2021)

The London Plan (2021) is the spatial development strategy for London, produced by the Greater London Authority on behalf of the Mayor of London. Every London Borough Local Plan must be in general conformity with the London Plan.

Policies surrounding sustainability are summarised below.

Policy SI2 Minimising greenhouse gas emissions

Major development should be net zero-carbon. This means reducing greenhouse gas emissions in operation, and minimising both annual and peak energy demand in accordance with the following energy hierarchy:

1. be lean: use less energy and manage demand during construction and operation.
2. be clean: exploit local energy resources (such as secondary heat) and supply energy efficiently and cleanly.
3. be green: maximise opportunities for renewable energy by producing, storing and using renewable energy on-site.
4. be seen: monitor, verify and report on energy performance.

A minimum on-site reduction of at least 35 per cent beyond Building Regulations is required for major developments. Residential development should achieve 10 per cent, and non-residential development should achieve 15 per cent through energy efficiency (“Lean”) measures.

The GLA requires the zero-carbon target to be achieved with a minimum 35% savings on-site, beyond the notional Part L 2013 baseline. The remaining carbon emissions (typically 65%) are offset through a cash in lieu payment to Haringey or offset through off-site measures, where possible. The money is used to fund carbon reduction projects in the Haringey boundary. This payment has to account for 30 years of carbon emissions at a fixed rate of cost and carbon intensity.

Policy SI3 Energy infrastructure

Major development proposals within Heat Network Priority Areas should have a communal low temperature heating system

1. the heat source for the communal heating system should be selected in accordance with the following heating hierarchy:
 - a. connect to local existing or planned heat networks
 - b. use available zero-emission or local secondary heat sources (in conjunction with heat pump, if required,
 - c. use low emission combined heat and power (CHP) (only where there is a case for CHP to enable the delivery of an area-wide heat network)
 - d. use ultra-low NOx gas boilers
2. CHP and ultra-low NOx gas boiler communal or district heating systems should be designed to ensure that they meet the requirements of policy SI1 (A)
3. where a heat network is planned but not yet in existence the development should be designed for connection at a later date.

Policy SI4 Managing heat risk

Development proposals should minimise adverse impacts on the urban heat island through design, layout, orientation, materials and the incorporation of green infrastructure. Major development proposals should demonstrate through an energy strategy how they will reduce the potential for internal overheating and reliance on air conditioning systems in accordance with the cooling hierarchy.

3.4.2 Resulting Energy and Carbon Approach

The London Plan zero carbon buildings requirement means developments must reduce regulated carbon dioxide emissions down to net zero over the year. This requires at least 35% reduction in regulated carbon dioxide emissions (using SAP 10) to be achieved on-site; the remaining regulated carbon dioxide emissions – to 100% reduction– are to be offset off-site, see Figure 3—2.

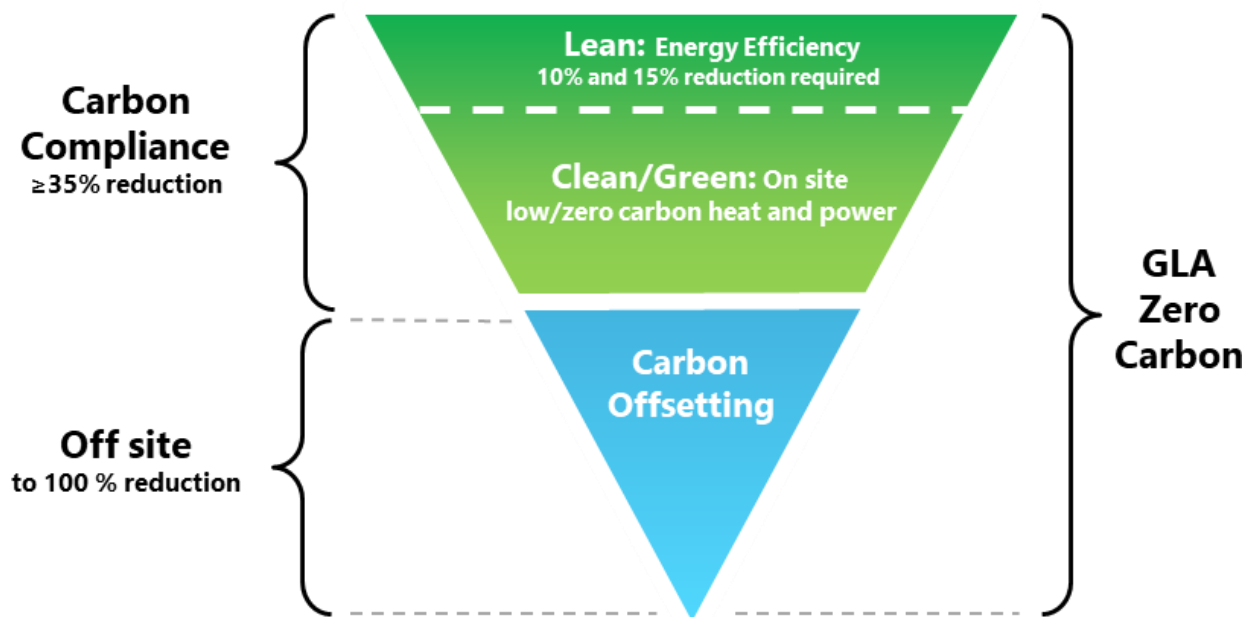


Figure 3—2 Zero carbon requirements

The New London Plan (2021) **Policy SI2** shows that the GLA are concentrating on a truly fabric first approach, meaning they will expect to see how the fabric specification has been pushed as much as possible before accepting.

On-site regulated carbon dioxide emissions are to be reduced by means of a combination of measures, following the structure outlined in the GLA Energy Hierarchy:

1. Be Lean: reduce energy demand by improving the building's fabric efficiency and ventilation system, and reducing lighting consumption to meet the 10% reduction for residential and 15% reduction for non- residential uses;
2. Be Clean: exploit local energy resources where feasible and supply energy efficiently; and
3. Be Green: install and use power generated by renewable energy sources on-site.

In line with the GLA Guidance (Policy SI3, 9.3.8), renewable energy sources are to be installed regardless of whether the on-site 35% reduction target has been already achieved with the previous steps of the Energy Hierarchy. An exception can be made in cases where it can be demonstrated that renewable technologies are not technically feasible or economically viable for the considered development.

Off-site carbon offsetting can be achieved through two main strategies:

1. Investing in existing local properties in the area, improving energy efficiency or installing renewable energy in order to generate an equivalent carbon reduction;
2. Carbon offset payments secured through a S106 agreement (as per footnote 155 of the London Plan).

3.5 Local Planning Policy

The LBH Local Plan comprises four main documents as outlined above which set out a number of policies applicable to developments in the Haringey area. The LBH Local Plan sets out goals across all elements of the sustainability and energy spectrum. These policies are typically in alignment with the London Plan (2021).

3.5.1 Strategic Policies 2013, with alterations adopted July 2017 ("SP")

Policy SP4 Working towards a Low Carbon Haringey

Over the lifetime of the Local Plan, reducing energy use in buildings and working towards a low carbon borough will be one of the key challenges facing Haringey. The Council will promote the measures outlined below to reduce carbon emissions from new and existing buildings.

1. In line with London Plan policy, the Council will promote and require all new developments to take measures to reduce energy use and carbon emissions during design, construction and occupation, by incorporating the following measures:
 - a. From 2011 onwards, all new residential development will achieve a minimum 25% reduction in total (regulated) CO2 emissions in line with Code for Sustainable Homes Level 4 energy standards and should aim to achieve Level 6. All new residential development shall be zero carbon from 2016 onwards; and
 - b. From 2011 onwards all new non-residential development shall be built to at least BREEAM "very good" standard and should aim to achieve BREEAM "excellent" or the current nationally agreed standard. All new non-residential development shall be zero carbon from 2019.
2. The Council will promote low- and zero-carbon energy generation through the following measures:
 - a. Requiring all developments to assess, identify and implement, where viable, site-wide and area-wide decentralised energy facilities including the potential to link into a wider network;
 - b. Establishing local networks of decentralised heat and energy facilities by requiring developers to prioritise connection to existing or planned networks where feasible;
 - c. Working with neighbouring boroughs and other partners to explore ways of implementing sub-regional decentralised energy networks including the potential in the Upper Lee Valley Opportunity Area; and
 - d. All new developments are required, where viable, to achieve a reduction in predicted carbon dioxide emissions of 20% from on-site renewable energy regeneration, which can include connections to local sources of decentralised renewable energy.

Haringey have inferred their interpretation of “Zero Carbon” within their document “Local Plan: Strategic Policies 2013 (with alterations 2017)”. On page 75 it confirms the following:

“In December 2008, the Government published Definition of Zero Carbon Homes and Non-Domestic Buildings: Consultation document, consulting on the definition of zero carbon homes and in particular an approach based on:

- a. High levels of energy efficiency in the fabric of the home;
- b. A minimum level of carbon reduction to be achieved on-site or through directly connected heat; and
- c. A list of (mainly offsite) allowable solutions for dealing with the remaining emissions (including from appliances).”

This definition of zero carbon is as per the GLA requirements, but the latter provide individual targets for “Lean” and “Green”.

3.5.2 LBH Development Management DPD (adopted July 2017) (“DM DPD”)

Policy DM22 Decentralised Energy

1. Subject to other policy requirements, proposals that contribute to the provision and use of Decentralised Energy network infrastructure will be supported.

Communal energy systems

2. All development that incorporates site-wide communal energy systems should examine opportunities for extending such systems, irrespective of whether it is connected to a DE network.
3. All development that incorporates site-wide communal energy systems should optimise opportunities for extending such systems beyond the site boundary to supply energy to neighbouring existing and planned future developments.

Existing and planned future DE networks

4. All development proposals should prioritise connection to existing or planned future DE networks.
5. All major development located within 500 metres of an existing DE Network, and minor new-build development located within 25 metres, will be expected to secure connection to that network subject to demonstration of technical feasibility and financial viability.
6. All major development located within 500 metres of a planned future DE Network, which is considered by the Council likely to be operational within 3 years of a grant of planning permission, will be expected to secure connection to that network subject to demonstration of technical feasibility and financial viability.

DE network ‘connection zones’

7. All major development located within 500 metres of a DE network ‘connection zone’ should be designed for connection to a DE network.
8. All minor new-build development located within 25 metres of a DE network ‘connection zone’ should be designed for connection to a DE network.

Customer charters

9. Where site-wide communal and district heating systems are operational, the Council will strongly encourage heat and energy service providers to enter into customer charters with domestic and micro-business customers.

3.5.3 Tottenham Area Action Plan (adopted July 2017) ("TAAP")

Site Allocation NT7: Tottenham Hotspur Stadium

The TAAP is the key statutory planning document for delivering the regeneration strategy for Tottenham. It establishes the local spatial planning framework for the area, giving detailed expression to the overall growth objectives for Tottenham as contained in the SP DPD.

The Site lies within the Tottenham Hotspur Stadium site allocation (NT7) for which the TAAP provides the following indicative development capacity:

285 net new homes

122,045 m² of leisure floorspace 6,000 m² of community floorspace 4,000 m² of commercial floorspace 18,830 m² of hotel floorspace

The TAAP allocates the Tottenham Hotspur Stadium site for comprehensive stadium-led development will be required across the site (Site Allocation NT7). As part of the development guidelines, the site allocation identifies the as being in an area with potential for being part of a Decentralised Energy (DE) network. Development proposals should be designed for connection to a DE network and seek to prioritise/secure connection to existing or planned future DE networks, in line with Policy DM22.

4 Energy Assessment

4.1 Introduction

In accordance with planning policy, the energy strategy for the development has been developed in alignment with the London Plan energy hierarchy; Be Lean, Be Clean, Be Green, and Be Seen.

This approach aims to minimise energy consumption from the outset through the use of efficient massing, passive measures and efficient systems before the deployment of low- and zero-carbon technologies.

- Lean: Maximise energy efficiency
- Clean: Supply energy efficiently using low carbon heating and cooling systems
- Green: Incorporate renewable energy
- Seen: Share metered operational energy data



Figure 4—1 Energy Hierarchy

Predicted carbon emissions have been taken from computer modelling software (SBEM and SAP methodology), in line with guidance outlined in the document entitled *GLA Energy Assessment Guidance (June 2022)*. The Table 4—1 below summarises the utilised methodologies and software.

Table 4—1 Modelling Methodologies

Typology	Methodology (software)	Required for
New build – Residential	SAP 10.2 (Elmhurst)	Building regulations / Planning Policy
New build – Non-domestic	Dynamic simulation model (IES)	Building regulations / BREEAM / Planning Policy

The GLA energy hierarchy has been adhered to, and each stage 'Be Lean', 'Be Clean' and 'Be Green' has been explored. The following sections explain the GLA energy hierarchy inputs outlined for the Site.

Table 4—2 Summary of modelling assumptions through the energy hierarchy

	Model assumptions and inclusions
Baseline – Building Regulations Notional Development (as generated by Part L software)	Baseline Target / Building Emission Rate (TER / BER) is modelled as a reference 'compliant' building, with the following features: Residential areas: - Notional fabric and glazing areas - Heat generation via individual gas boilers Non-Domestic areas: - Notional fabric and glazing areas - Heat generation via Energetik DEN as per actual building
Lean - Energy efficiency measures applied	Improved energy efficient model, with the following features: - Improved building fabric including triple glazing and enhanced air tightness - Energy efficiency measures as required to achieve 10% reduction for residential areas, on Part L 2021 (NCM and SAP) compliance - Highly energy efficient lighting fittings and controls
Clean - Connecting to District energy network (DHN)	- Connection to the existing Energetik heat from waste District Energy Network with heat carbon intensity of 0.015 kgCO ₂ /kWh
Green - Renewable Energy Technology	- Provision of roof mounted solar photovoltaic array, allocated entirely to the non-domestic building areas

The following sections set out the carbon dioxide emissions reductions achieved for each building typology at each stage of the energy hierarchy.

4.2 Unregulated emissions

Non-domestic unregulated emissions and energy consumption have been estimated using the assumptions for equipment use provided in the NCM activity templates. These demands are assumed to be provided by grid electricity in all instances, with the relevant carbon factor applied to calculate associated carbon emissions.

Domestic unregulated emissions from energy consumption such as electrical appliance usage and cooking have been estimated using the SAP methodology as outlined in Appendix L of The Government's Standard Assessment Procedure for Energy Rating of Dwellings, SAP 10.2.

For both domestic and non-domestic buildings, the estimates are based on floor area and are therefore assumed not to change between each stage of the energy hierarchy.

Table 4—3 Estimated site-wide unregulated energy consumption and carbon emissions

Typology	Unregulated Energy Consumption		Unregulated Carbon Emissions	
	MWh/year	kWh/m ² /year	Tonnes CO ₂ /year	kg CO ₂ /m ² /year
Domestic	230.9	34.6	31.4	4.7
Non-Domestic	79.4	10.1	10.8	1.4
Total	310.3	21.3	42.2	2.9

5 Baseline

Baseline energy demands and associated carbon dioxide emissions have been estimated in line with the methodology set out in the previous section, following the GLA's "Guidance for Preparing Energy Statements" (June 2022). Part L compliance modelling has been carried out to assess the proposed development geometry using Notional Building fabric and building services specification as stipulated in the relevant guidance documents for each area of the following entities:

Residential

- SAP version 10.2
- Approved Document Part L1 2021

Non-domestic

- National Calculation Methodology modelling guide (for buildings other than dwellings) 2021 Edition (September 2022)
- Approved Document Part L2 2021

Although both are based on the Building Regulations Part L 2021 Notional Building, the Baseline for residential areas is required to be an individual gas boiler system whereas the non-domestic areas use the values from the Actual proposed existing heat network connection. The difference between the two methodologies is stipulated in Section 9.19 of the GLA's "Energy Assessment Guidance" (June 2022). Following this guidance allows for the carbon emissions savings from the heat network to be demonstrated at the Clean stage for the residential areas but this is not possible for the non-domestic. Alternative Baseline emission scenarios could be provided to show this benefit, if required by LBH.

The following diagram shows the methodology approach for each of the Part L entities (domestic and non-domestic).

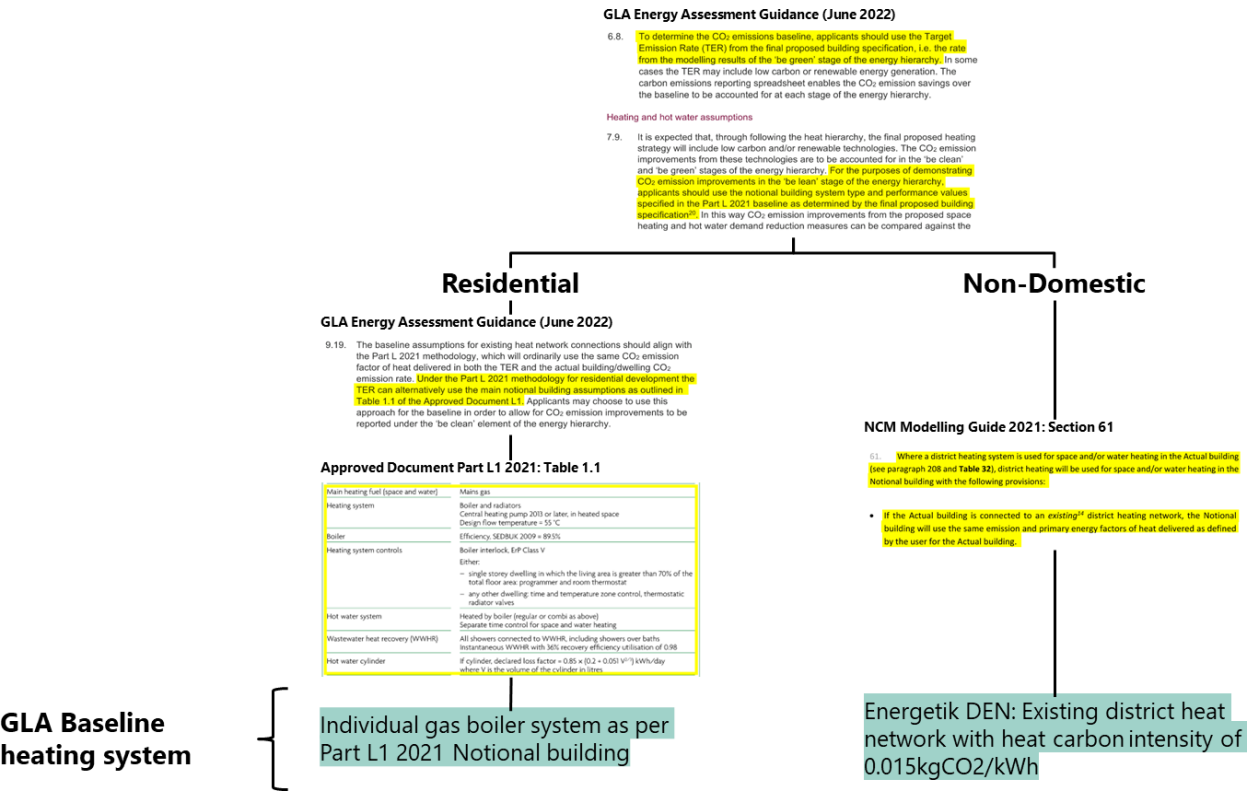


Figure 5—1 Flow chart showing the guidance followed in defining Baseline carbon emissions

5.1 Baseline Carbon Emissions

The following table sets out the predicted carbon dioxide emissions for the baseline building for each typology.

Table 5—1 Baseline predicted carbon emissions

Typology	Baseline Regulated Carbon Emissions	
	kg CO ₂ /year	Tonnes CO ₂ /year
Domestic	70964.0	71.0
Non-Domestic	59,364	59.4
Sitewide	130,329	130.4

6 Be Lean

This section outlines the strategic demand reduction and energy efficiency measures integrated in the proposed development and their impacts on energy demand and carbon reductions. The values provided are indicative fabric and services specifications which will be reviewed throughout the design process to ensure compliance with Part L and planning policy.

6.1 Passive design strategy

The diagram below shows the key passive design measures that are being employed in the scheme.

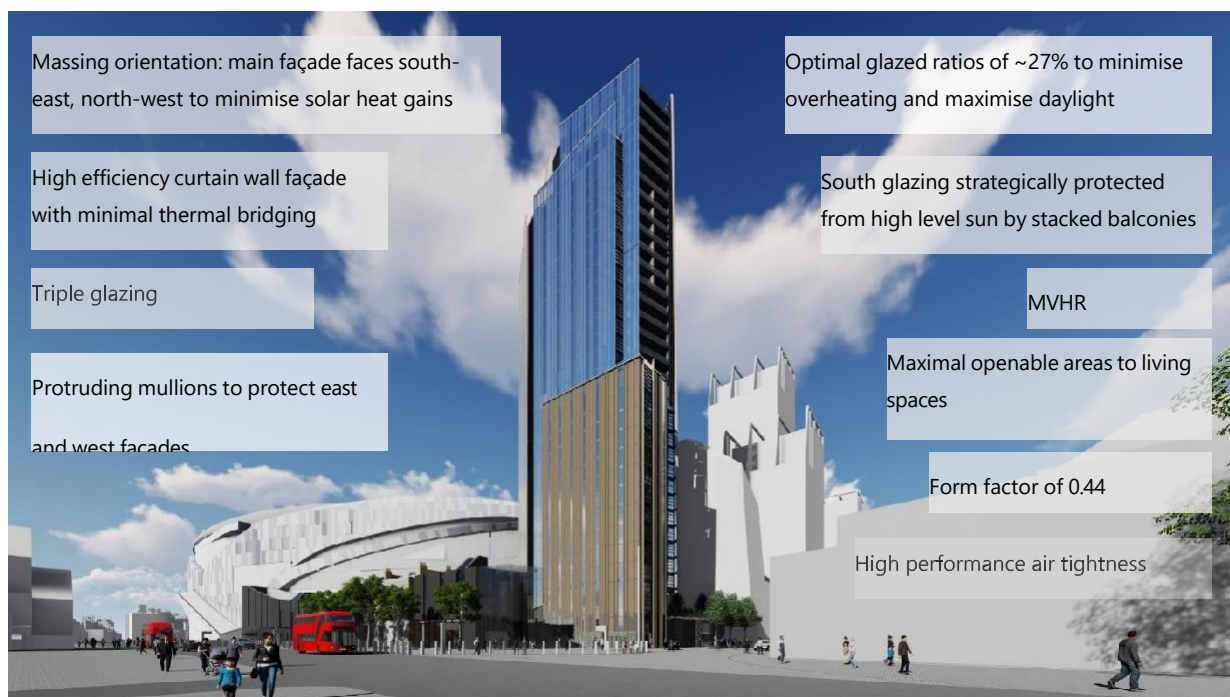


Figure 6—1 Summary of passive design measures

The following passive design approaches have been considered and incorporated to minimise the energy consumption of the proposed development:

- Optimised window-to-wall ratio of 27% to limit unwanted solar gains but maintain good levels of daylight
- High levels of airtightness and optimum U-values to minimise heat losses from the thermal envelope;
- Glazing with optimum g-value and U-value to reduce heat gains and losses;
- High performance unitised curtain wall system including triple glazing, additional backing insulation and bespoke, thermally-broken framing system;
- External shading fins or “projected mullions” providing enhanced solar gain mitigation;
- The balconies on the south are strategically positioned to shade the glazing from the high-angle southerly sun to minimise overheating risk.

6.2 Building Fabric

The building fabric specification, as set out in the table below, is consistent across all building areas and typologies.

Table 6—1 Fabric specification

Fabric element	Unit	Proposed design	Notional building Part L2 2021
Curtain walling	W/m ² .K	0.64	Walls: 0.18 Windows: 1.4
Glazing g-value*	-	0.3-0.5	0.29
Roof	W/m ² .K	0.13	0.15
Floor	W/m ² .K	0.13	0.15
Airtightness	m ³ /m ² @50Pa	3	3

* Effective g-value created by the external shading structure has been accounted for as an effective g-value. Hotel windows within the darker aspect of the façade have a g-value of 0.3.

Table 6—2 Thermal bridges

Reference (SAP)	Junction detail applicable to whole junction	Included or excluded from Curtain Wall U-Value in SAP modelling	How was it modelled in SAP?	Psi Value in SAP (W/m.K)
E2	Other lintels	Included	Inputted length=0 with psi=0	0
E3	Sill	Included	Inputted length=0 with psi=0	0
E4	Jamb	Included	Inputted length=0 with psi=0	0
E7	Party floor between dwellings	Included	Inputted measured length with psi=0	0
E23	Balcony within or between dwellings. Balcony support penetrates wall insulation	Included	Inputted measured length with psi=0	0
E16	Corner (normal)	Excluded	Inputted measured length with psi=0.09	0.09
E18	Party wall between dwellings	Included	Inputted measured length with psi=0	0

6.3 Domestic building services

The energy performance values for the proposed building services used in the SAP modelling (10.2) and following Part L1 compliance are set out in the table below.

At the Lean stage of the energy hierarchy, the heating system for residential areas for space heating and domestic hot water is modelled as an individual gas boiler with performance aligned to the Notional building values from Table 1.1 of Part L1 2021, as stipulated by the GLA Energy Assessment Guidance (2022).

Table 6—3 Domestic building services specifications

Element	Value	Notes
Ventilation Specific Fan Power (SFP)	0.58 W/L/s 0.55 W/L/s 0.63 W/L/s	Values provide are from SAP Product Characteristics Database (PCDB) for Kitchen +1 wet rooms, Kitchen +2 wet rooms, Kitchen +3 wet rooms
Ventilation heat recovery efficiency	91 %	Value from PCDB
Lighting	100 %	Energy efficient lighting to be specified
Cooling SEER	4.6	From central air-cooled chiller system

6.4 Non-domestic building services

The energy performance values for the proposed building services for the non-domestic areas following Part L2 compliance are set out in the following tables.

6.4.1 Central heating plant

At all stages of the energy hierarchy the non-domestic heating system for space heating and domestic hot water is modelled as connection to the existing heat network, using the performance values set out in the Be Clean section of this report.

6.4.2 Domestic hot water systems

Table 6—4 Domestic hot water performance assumptions

Item	Units	Value
Cylinder volume	Litres	7200
Cylinder Loss	kWh/l/day	0.0026
Secondary Circulation Pipe Length (total flow & return)	m	2100
Secondary Circulation Pipe Loss	W/m	5.0
Secondary Circulation Pump Power	kW	2.0
Timeswitch		No

6.4.3 Central cooling plant

Table 6—5 Cooling plant performance

Heat source	Fuel	SEER (Seasonal Energy Efficiency Ratio)
Air source heat pumps	Electricity	4.8

6.4.4 Pumping

Variable speed pumping with multiple differential pressure sensors in the field is required for all LTHW and CHW circuit distribution.

6.4.5 Ventilation systems

All main AHUs should be selected to meet the leakage class defined in the below table. Requirements for ductwork pressure testing are also provided.

Table 6—6 Ventilation leakage performance

Parameter	Value
Ductwork Pressure Testing	CEN Class B
AHU Leakage Class	CEN Leakage Class L2

6.4.6 Space conditioning systems

Table 6—7 HVAC system parameters

NCM System	Heat Recovery Type	Heat Recovery Efficiency	Ventilation SFP (W/l/s)	Terminal unit SFP (W/l/s)	Demand controlled ventilation
Fan coil units	Thermal wheel	80%	1.6	0.15	CO ₂ sensors, fan speed controlled

6.4.7 Lighting systems

The following lighting systems have been specified:

- Average luminaire efficacy of 110 Lm/W has been assumed for all spaces
- Daylight linking for all perimeter zones
- Presence detection for all public circulation
- Absence detection for all bedroom and bathrooms.

6.4.8 Power factor correction

Power factor correction to greater than 0.95 will be included.

6.4.9 Metering and monitoring

Automatic metering and monitoring with out-of-range alarms is proposed for all mechanical and electrical services. A suitable BeMS system would typically be installed to satisfy this requirement.

6.5 Lean carbon emissions

The following table sets out the predicted carbon dioxide emissions for the Lean building case for each typology in comparison to the relevant Baseline.

6.6 Residential fabric energy efficiency

Table 6—8 Residential fabric energy efficiency figures – excerpt from GLA spreadsheet

	Target Fabric Energy Efficiency (kWh/m²)	Dwelling Fabric Energy Efficiency (kWh/m²)	Improvement (%)
Development total	31.56	27.86	12%

7 Be Clean

In order to deliver the greatest savings in carbon dioxide emissions possible, the feasibility of decentralised systems suitable for the development have been explored below.

London Borough of Haringey and the Greater London Authority strongly promote the implementation of decentralised energy networks (DENs) across London. In alignment with planning policy, the feasibility of a DEN within the context of the development has been assessed through the following hierarchy:

1. Connection to existing/proposed networks
2. Development of a new DEN
3. Site-wide network with provision for future DEN connection.

7.1 Energy Networks

With any new development, the potential to connect into an existing or proposed DEN can provide significant benefits for the reduction of carbon dioxide emissions for the development itself and the wider network. This is typically achieved by sharing waste heat and delivering the heat with greater efficiencies that are achievable at a bigger scale. Exploring connection into a planned network can increase the viability of the network itself by creating additional demand and future revenues.

There are proposed district energy networks that will be located in the vicinity of the Proposed Development as the area has been identified as a key development area within the Haringey Sustainable Design and Construction SPG1. The identified area can be seen as Zone 1 in Figure 7—1 largely driven by the proposals for the regeneration of the North Tottenham, White Hart Lane and Northumberland Park area.

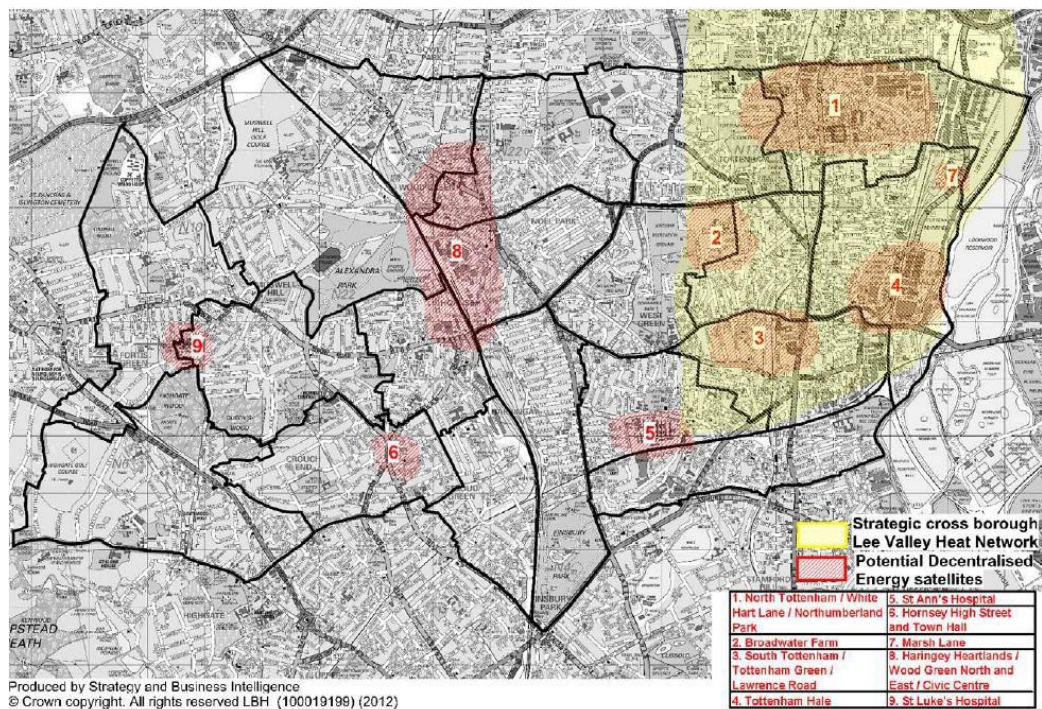


Figure 7—1 Potential for decentralised energy in Haringey (Local Plan: Sustainable Design and Construction SPG Appendices Pg 8)

The London Heat Map below also shows there are proposed district energy networks in the near vicinity of the site: It shows a potential district energy network proposed for Park Lane, to the south of the Application Site. This network is called the “Upper Lee Valley 1 (Haringey and Waltham Forest only)”.

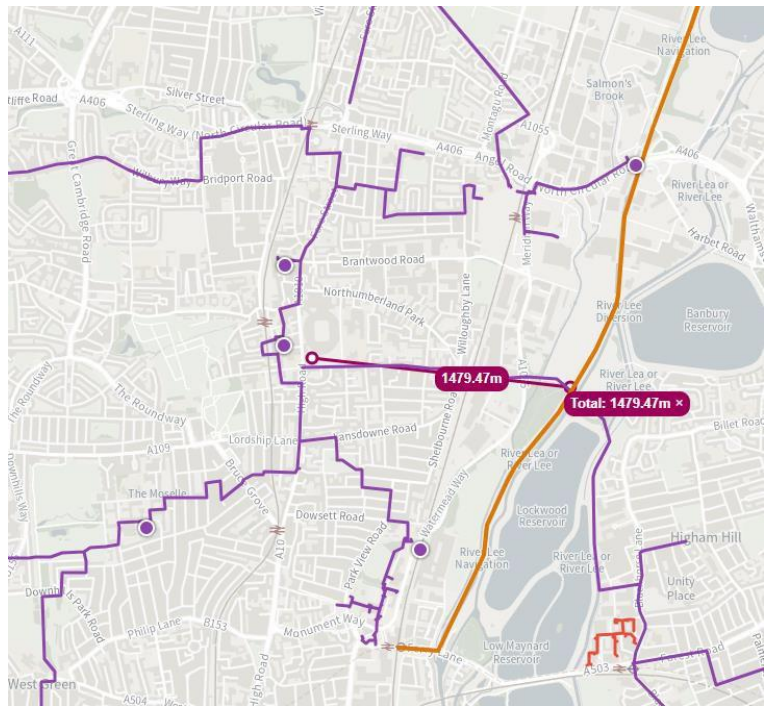


Figure 7—2 Proposed district energy networks running close to the Application Site

The London Borough of Haringey have previously provided the following heat network map to Buro Happold.

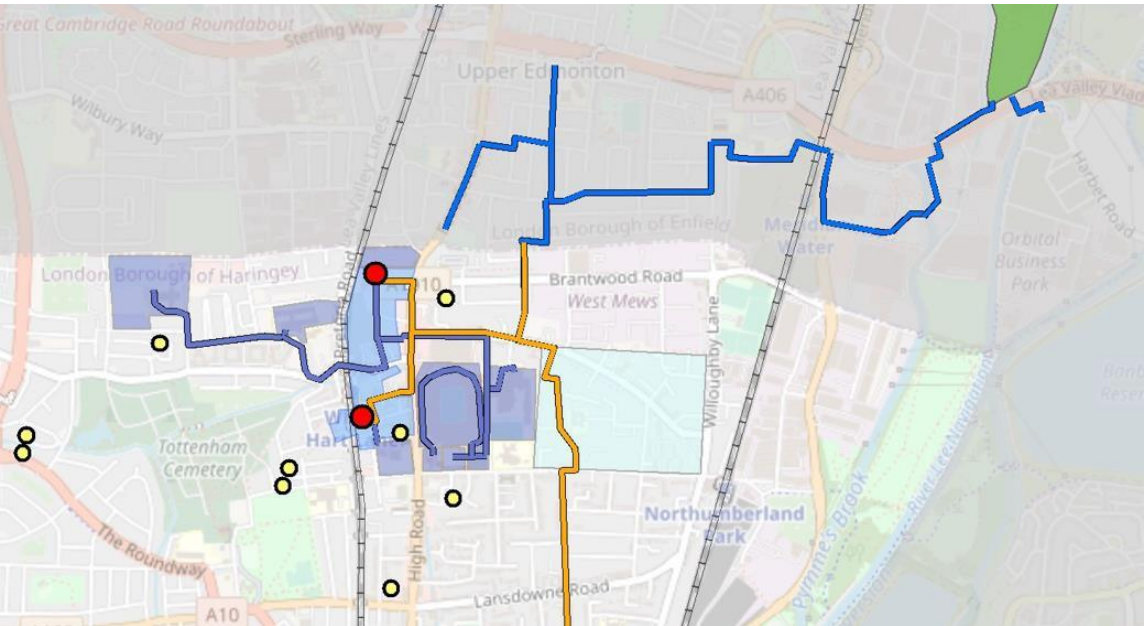


Figure 7—3 Meridian Water Heat Network Proposed Network Routes, Energetik/Meridian Water Network (Blue, Orange, Purple), Energy Centre Locations (Red Dots), Existing HRA sites (Yellow Dots). Provided by LBH

Energetik are one of the operators of a potential DEN. Our latest discussion with Energetik (telephone conversation 12th May 2023), confirmed that their current estimate is that the DEN pipework will be available in the Hotel location towards late 2025.

The Applicant and Buro Happold have been in technical and commercial discussions with Energetik since late 2019 to establish the feasibility of connecting several of the Applicant’s developments, including the hotel. Those discussions have culminated in Energetik putting forward Commercial and Residential Development Connection and Supply Agreements, which the Applicant is currently considering in the context of several schemes. As at 12th May 2023, Energetik have advised that the hotel could connect into their DEN from late 2025 onwards, which should fit with the hotel construction programme.

An overview summary of engagement with the DEN Operator is demonstrated below:

Date	Details
12 May 2023	Our latest discussion with Energetik (telephone conversation 12th May 2023), confirmed that their current estimate is that the DEN will be available in the Hotel location towards late 2025.
21 October 2022	Energetik DEN - Residential Development Connection Agreement and Framework Supply Agreement with Subsidiary (Customer) Supply Agreements
21 October 2022	Energetik DEN - Commercial Development Connection & Supply Agreement.
26 April 2021	Design Note on DEN connections for the Proposed High Road West scheme. Including carbon intensity at connection. Standing charges and available capacities.
13 April 2021	Information provided by Energetik on tariffs.
5 November 2019	Design Note on carbon factor appraisal

The energy strategy will seek to connect to the DEN from the first occupation of the hotel building. This strategy assumes that the Energetik DEN is available by 2025 and a connection is technically deliverable and financially viable to allow provision for connection into a district energy network. Taking this into account, the scheme has been designed to include plate heat exchangers and suitable pipework connections.

The proposed basement energy centre has been sized and placed along the Park Lane façade of the Hotel building to ensure ease of later connection in to the proposed route. A diagram illustrating the likely future connection into a DEN can be seen in the following figure.

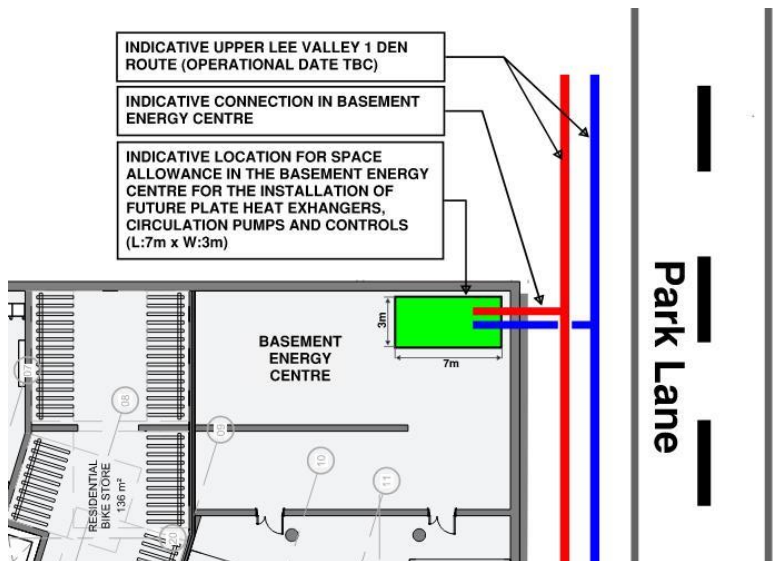


Figure 7—4 Proposed location for future DEN connection into the Application Site

It is anticipated that, for the predicted heating capacity required for the site, a space allocation of 7m x 3m would suffice for the installation of the plate heat exchangers, circulation pumps and all associated controls. The schematic below shows a typical dual plate heat exchanger arrangement, complete with all required monitoring and control devices which is likely to be installed as part of the distinct heating future connectivity.

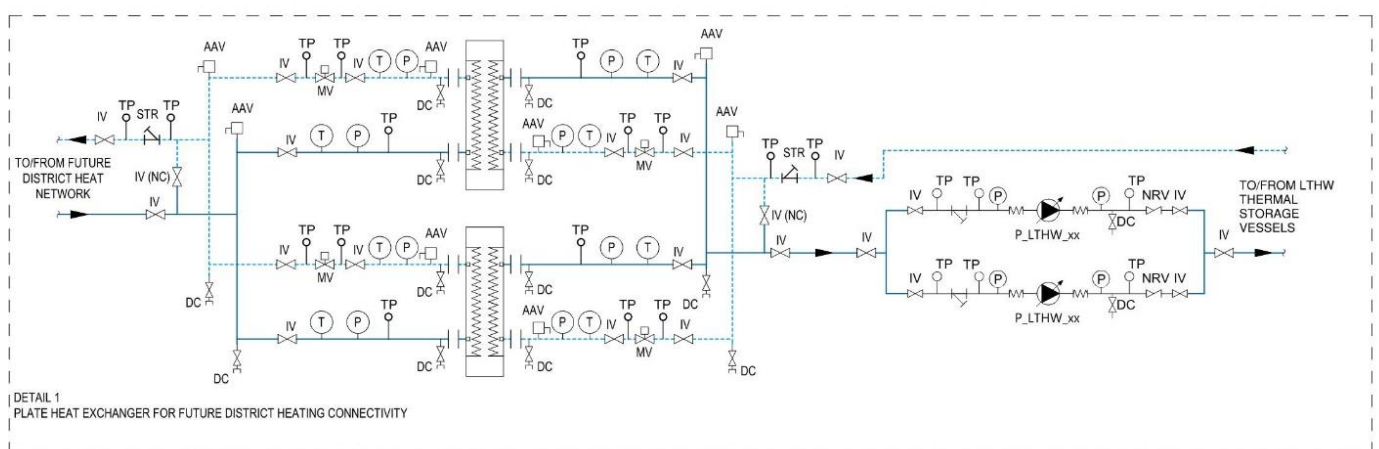


Figure 7—5 Detail 1 – Plate Heat Exchanger arrangement for future district heating connectivity

If the DEN connection is unavailable or is otherwise not technically deliverable or financially viable, the proposed fallback solution for heat delivery is as follows:

- Roof-mounted Air-source heat-pumps (ASHP) serving hotel rooms and amenity spaces with low temperature hot water (LTHW) for space heating supplied via underfloor heating or connection in to 4-pipe FCUs for amenity spaces
- Basement located Water-Source heat pumps that raise the hot water temperature supplied by the ASHP to supply domestic hot water for hotel rooms and amenity spaces
- DHW thermal stores
- Provision and a strategy for future connection to a district energy network when it becomes available, and
- Mid-level plant room ASHP serving residential apartments with LTHW for space heating and DHW via apartment Heat Interface Units.

There are design provisions in place in terms of space allowance in order to accommodate the above, should this fallback be required.

7.2 Clean carbon emissions

The following table sets out the predicted carbon dioxide emissions for the Clean building case for each typology in comparison to the relevant Baseline.

Table 7—1 Clean predicted carbon emissions

Typology	Baseline Regulated Carbon Emissions		Clean Regulated Carbon Emissions		
	kg CO2/year	Tonnes CO2/year	kg CO2/year	Tonnes CO2/year	% Improvement over Baseline
Domestic	70964.0	71.0	12697.0	12.7	82.1%
Non-Domestic	59364.0	59.4	53844.9	53.8	9.4%
Sitewide	130.329	130.3	66541.0	66.5	49.0%

8 Be Green

Low and Zero Carbon (LZC) technology can help to deliver significant Carbon Dioxide emissions reductions arising from developments. The table below summarises the potential of various LZC technologies considering the context of the proposed development.

Technology	Comments	Viability
Wind turbine	- Generates electricity - Development is located in a high density urban environment. Wind flows in such locations are often turbulent which significantly reduce the available energy output - No land area for installation of a turbine. Roof mounted vertical axis systems do not offer an efficient method of generation.	 LOW
Biomass	- Generates heat/hot water - Development's location in central London creates difficulties for frequent fuel deliveries and air quality - Poor compatibility with proposed District Heating connection from wider network	 LOW
Air source heat pump	- Generates heat/hot water (pre-heat) - Would only be used as an alternative to the DEN in order to meet space heating requirements. - Potential noise issues and visual impact - Poor compatibility with proposed District Heating connection from wider network.	 MEDIUM
Ground source heat pump	- Generates heat/hot water (pre-heat) - Requires close coupling to building piles which have already been built. - Not enough ground availability for a large shallow area in which a 'slinky' can be laid - Poor compatibility with proposed District Heating connection from wider network	 LOW
Solar thermal	- Generates heat/hot water - Low maintenance, efficient technology - Moderate Carbon Dioxide emissions savings due to displacement of natural gas instead of Carbon Dioxide emissions intensive grid electricity - Most suitable for hotel and residential application, however there is limited ratio of available roof area to NIA. - Poor compatibility with proposed District Heating connection from wider network	 MEDIUM

Solar Photovoltaics (PV)	- Generates electricity - Roof areas are available as identified - Simple installation, low maintenance - Good delivered Carbon Dioxide emissions savings for the development compared to Carbon Dioxide emissions intensive national grid supply	 HIGH
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As demonstrated above, LZC options for the development are limited to solar technologies. It is considered that the limited roof area available would be more beneficial for solar photovoltaics from a Carbon Dioxide emissions reduction perspective as heat-based savings will be delivered from the DEN connection. If the DEN becomes unviable then this LZC strategy will be reappraised.

8.1.1 Proposed solution

The image below shows the roof plan with the required plant room space located to the north. The remaining space to the south is dedicated to photovoltaics which will be dedicated to the non-domestic usage. The PV panels are modelled with an inclination off the horizontal of 20° and a shading factor conservatively set to 0.80. The efficiency of the panels is set to 22.6% with an electric conversion factor of 0.98.

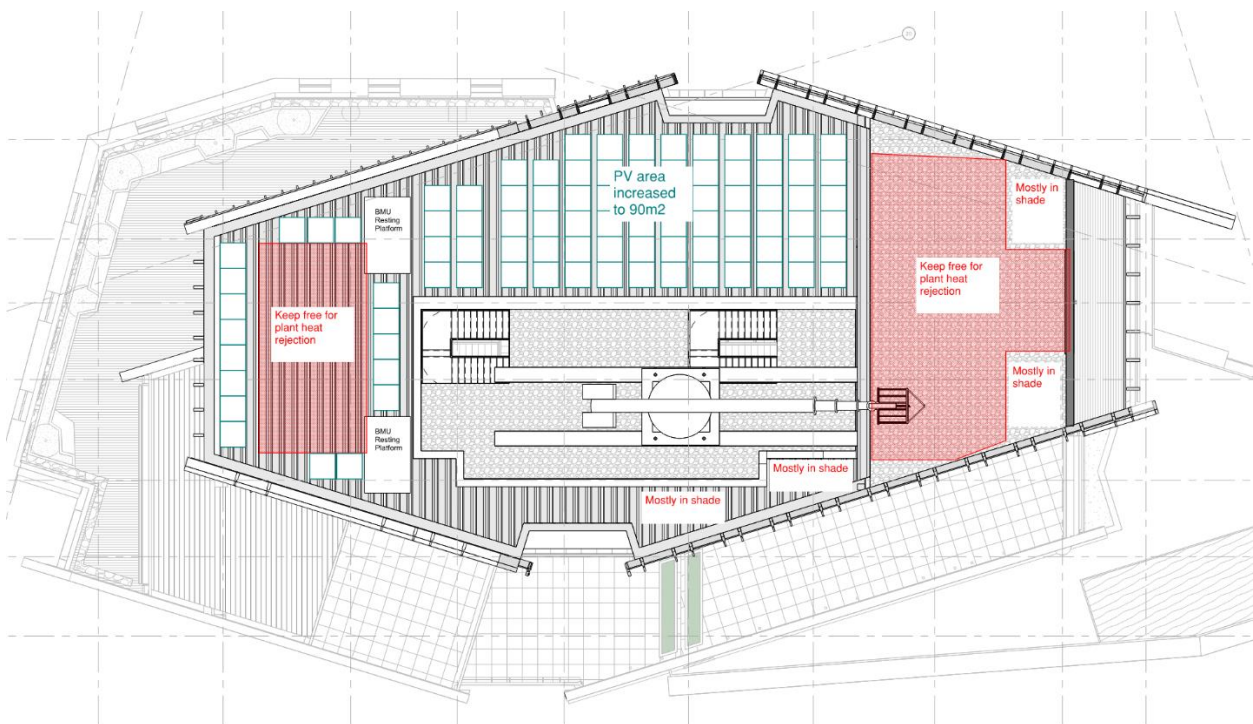


Figure 8—1 Photovoltaics located on the roof

For the full PV spec, please refer to Appendix E.

8.2 Green carbon emissions

The following table sets out the predicted carbon dioxide emissions for the Green building case for each typology in comparison to the relevant Baseline.

Table 8—1 Green predicted carbon emissions

Typology	Baseline Regulated Carbon Emissions		Green Regulated Carbon Emissions		
	kg CO ₂ /year	Tonnes CO ₂ /year	kg CO ₂ /year	Tonnes CO ₂ /year	% Improvement over Baseline
Domestic	70964.0	71.0	14182.0	14.2	80.0%
Non-Domestic	59364.0	59.4	54707.0	54.7	7.9%
Sitewide	130329.0	130.3	68889.0	68.9	47.1%

9 Energy Hierarchy Summary

The carbon emissions results for each stage of the London Plan energy hierarchy have been collated in the format required for the planning submission, using the latest version of the GLA's Carbon Emissions Reporting Spreadsheet V2.0. The following figures and tables outline the carbon emissions of each typology and the site overall.

9.1 Residential carbon emissions

Table 9—1 Table showing the estimated annual carbon emissions at each stage of the energy hierarchy (Part L 2021) – Residential

	Carbon Dioxide Emissions for residential buildings (Tonnes CO ₂ per annum)	
	Regulated	Unregulated
Baseline: Part L 2021 of the Building Regulations Compliant Development	71.0	31.4
After energy demand reduction (be lean)	54.9	31.4
After heat network connection (be clean)	12.7	31.4
After renewable energy (be green)	14.2	31.4

Table 9—2 Table showing the estimated carbon savings at each stage of the energy hierarchy (Part L 2021) – Residential

	Regulated residential carbon dioxide savings	
	(Tonnes CO ₂ per annum)	(%)
Be lean: savings from energy demand reduction	16.1	23%
Be clean: savings from heat network	42.2	59%
Be green: savings from renewable energy	-1.5	-2%
Cumulative on site savings	56.8	80%
Annual savings from off-set payment	14.2	-
	(Tonnes CO ₂)	
Cumulative savings for off- set payment	425	-
Cash in-lieu contribution (£)	40,420	

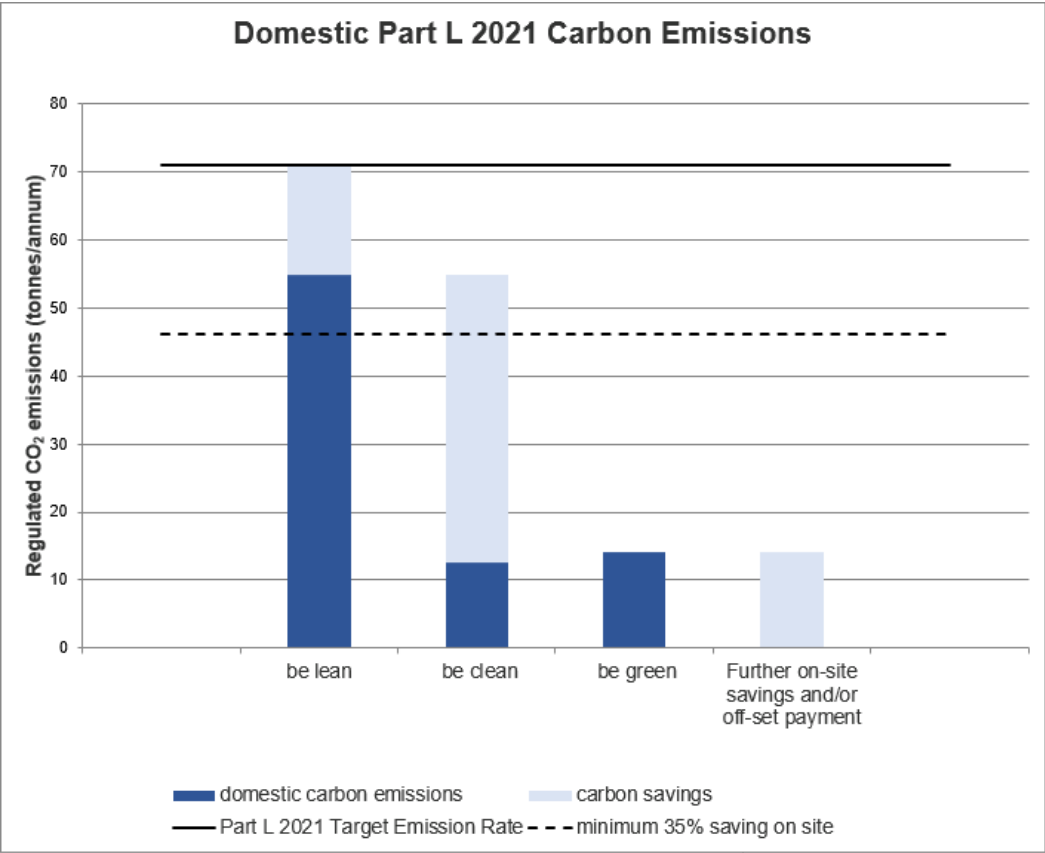


Figure 9—1 Graph showing carbon savings at each stage of the energy hierarchy (Part L 2021) – Residential

The residential carbon emissions results demonstrate compliance with the 10% reduction target through energy efficiency measures alone. The results also demonstrate compliance with the 35% reduction target through on-site measures.

9.2 Non-domestic carbon emissions

Table 9—3 Table showing the estimated annual carbon emissions at each stage of the energy hierarchy (Part L 2021)– Non-domestic

	Carbon Dioxide Emissions for non-residential buildings (Tonnes CO ₂ per annum)	
	Regulat ed	Unregulat ed
Baseline: Part L 2021 of the Building Regulations Compliant Development	59.4	10.8
After energy demand reduction (be lean)	53.8	10.8
After heat network connection (be clean)	53.8	10.8
After renewable energy (be green)	54.7	10.8

Table 9—4 Table showing the estimated carbon reductions at each stage of the energy hierarchy (Part L 2021)– Non-domestic

	Regulated non-residential carbon dioxide savings	
	(Tonnes CO ₂ per annum)	(%)
Be lean: savings from energy demand reduction	5.5	9%
Be clean: savings from heat network	0.0	0%
Be green: savings from renewable energy	-0.9	-1%
Total Cumulative Savings	4.7	8%
Annual savings from off-set payment	54.7	-

Annual savings from offset payment

	(Tonnes CO ₂)	
Cumulative savings for off-set payment	1,641	-
Cash in-lieu contribution (£)	155,914	

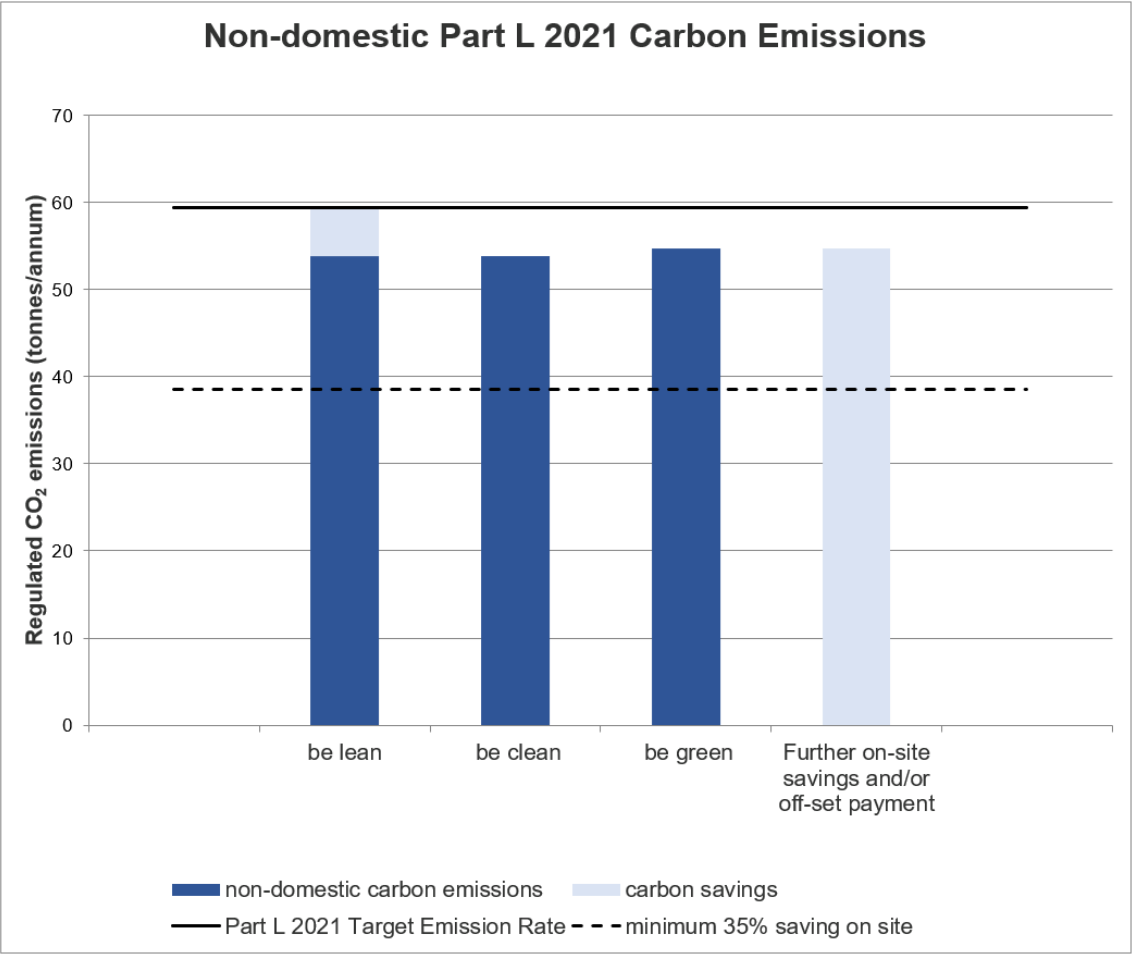


Figure 9—2 Graph showing carbon savings at each stage of the energy hierarchy (Part L 2021) – Non-domestic

The non-domestic carbon emissions results show compliance with the 15% reduction target through energy efficiency measures alone has not been achieved. The results also show compliance with the 35% reduction target through on-site measures has not been achieved.

Although the building design includes high performance façade and building services, the building does not achieve the targets because the Baseline building has an unrealistically low domestic hot water demand, as stipulated by the building typology.

That the building does not strictly comply with policy carbon emissions reduction targets is not uncommon and is addressed explicitly within the GLA’s cover note entitled “Energy Assessment Guidance updates - Part L 2021 of building regulations”, as shown below.

- Initially, non-residential developments may find it more challenging to achieve significant on-site carbon reductions beyond Part L 2021 to meet both the energy efficiency target and the minimum 35 per cent improvement. This is because the new Part L baseline now includes low carbon heating for non-residential developments but not for residential developments. However, planning applicants will still be expected to follow the energy hierarchy to maximise carbon savings before offsetting is considered.

Figure 9—3 Extract from “Energy Assessment Guidance updates - Part L 2021 of building regulations”

The development still follows the energy hierarchy, as described in the previous sections, by first reducing energy demand, reducing energy intensity of system, then supplying energy via low carbon sources in order to maximise carbon savings.

9.3 Site wide carbon emissions

Table 9—5 Table showing the estimated carbon reductions at each stage of the energy hierarchy (Part L 2021) – site-wide

	Total regulated emissions (Tonnes CO ₂ / year)	CO ₂ savings (Tonnes CO ₂ / year)	Percentage savings (%)
Part L 2021 baseline	130.3	N/A	N/A
Be lean	108.8	21.6	17%
Be clean	66.5	42.2	32%
Be green	68.9	-2.3	-2%
Total Savings	-	61.4	47%
	-	CO ₂ savings off-set (Tonnes CO ₂)	-
Off-set	-	2,066.7	-

For both residential and non-domestic areas, at the Lean and Clean stages the presented carbon emissions include savings from the PV generation of the Notional Building as stipulated in section 7.7 of the GLA's Energy Assessment Guidance (June 2022), shown below. This results in an apparent increase in carbon emissions between the clean, and green stages. This is an outcome of the calculation methodology and does not represent actual increase in emissions.

- 7.7. The applicant must clearly identify the extent to which Part L 2021 of the Building Regulations is exceeded through the use of these demand reduction measures alone, i.e. the percentage improvement of the BER/DER over the Target CO₂ Emissions Rate (TER)¹⁹ before the inclusion of a heat network connection and use of on-site renewables. Where the TER includes on-site renewable generation from PV, the carbon emissions reporting spreadsheet will automatically enable savings from 'be lean' measures only to be reported.

Figure 9—4 Extract from "GLA Energy Assessment Guidance (June 2022)"

10 Be Seen

The New London Plan Policy SI 2 stipulates that all major development proposals must be designed to be capable of monitoring and reporting on their actual operational energy performance. This data driven approach to building performance aims to bridge the 'performance gap' through understanding discrepancies between design theory and in-use operation.

'Be Seen' has been added to the GLA energy hierarchy to further outline the critical impact that post occupancy monitoring, and comparative assessment has on the energy use of a building and its value to the industry as a means of rationalising design. The figure below outlines the reporting required at each stage of development and the associated parties responsible for collating this information:

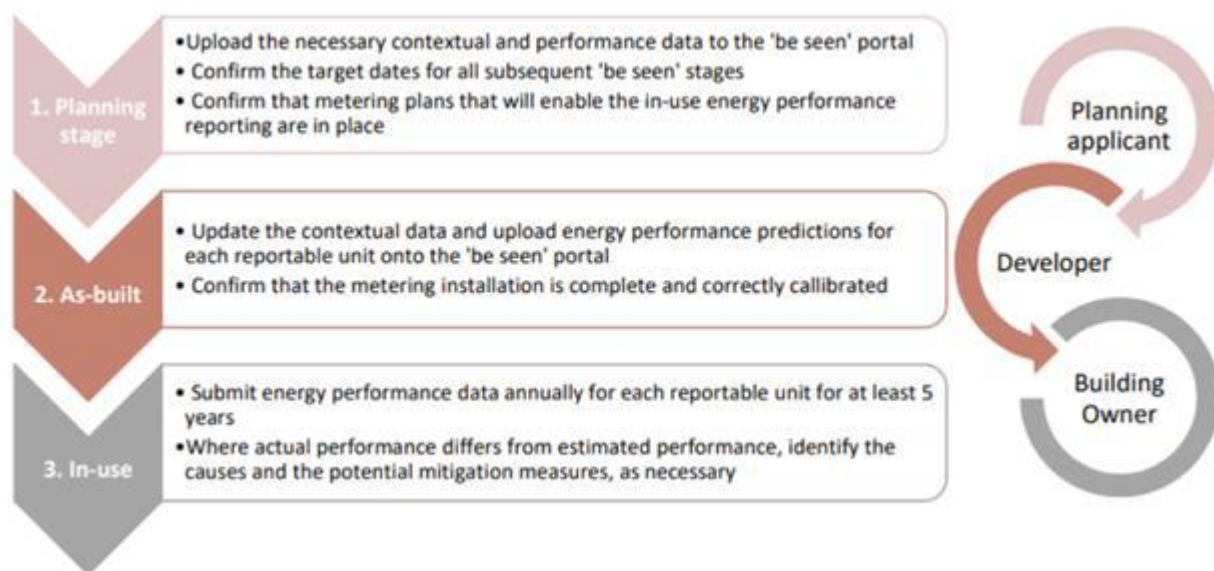


Figure 10—1 'Be Seen' processes and responsibilities.

10.1 Metering Guidance & Legislation

Effective energy metering in line with the Be Seen requirements will be enabled by the provision of suitable infrastructure within the buildings services systems. The methodology used broadly follows the recommendations set out, for non-domestic buildings, in CIBSE TM39: 2009 Building Energy Metering, BREEAM 2018 NC, as well as the principles set out in NABERS-UK Rules for Metering and Consumptions (May 2022).

The Metering and monitoring of residential areas will consider the same concepts as well as the Heat Network Metering and Billing Regulations (2014) to allow for accurate billing of the apartments.

10.1.1 Domestic Legislation and Guidance

- Water – approved meters for the monitoring and billing of the water consumed are required to meet standards set out by OFWAT
- Heat Networks – regulations developed by the Department for Business, Energy & Industrial Strategy apply (Heat Network (Metering and Billing) Regulations 2014)
- Part L1A -2021– Building Regulations specific to domestic buildings.
- CIBSE TM 39 :2009 Building Energy Metering – although written for non-domestic buildings, the principles of metering strategies can be adapted for residential buildings
- BRE Home Quality Mark for Energy and Water
- LETI Climate Emergency Design Guide (pages 98-107).

10.1.2 Non-Domestic Legislation and Guidance

- Electricity - approved tariff-based meters, meeting standards set out by the Office of Gas and Electricity Markets (OFGEM) are required for energy monitoring and billing purposes
- Water – approved meters for the monitoring and billing of the water consumed are required to meet standards set out by the Office of Water Services (OFWAT)
- Heat Networks – regulations developed by the Department for Business, Energy & Industrial Strategy apply (Heat Network (Metering and Billing) Regulations 2014)
- Part L2A -2013 – Building Regulations specific to non-domestic buildings;
- CIBSE TM 39:2009 Building Energy Metering
- BREEAM 2018 – Ene02 Energy Monitoring
- CIBSE TM 22 - Energy assessment and reporting method
- The European Measuring Instruments Directive (MID) 2004/22/EC, Measuring Instruments Directive
- GLA “Be Seen” Energy Monitoring Guidance – October 2020
- NABERS-UK Rules for Metering and Consumptions (May 2022).

10.2 Proposed Metering Strategy

The proposed metering strategy of the building by the MEP consultant will include the following:

- Additional meter on the main resident’s supply (or residents meter readings need to be collected and collated individually)
- Renewables are sub-metered for generation
- Special uses (such as electric vehicle charging) is sub-metered
- Individual bi-directional heat meters per dwelling

- Provide a visual energy display device to raise awareness and make users responsible for their energy consumption
- Meter and report landlord areas separately
- Commercial areas metered and reported separately
- Ensure OFGEM compliant meters
- Upload data to publicly accessible platform for five years.

11 Overheating

11.1 The Overheating Strategy

The current drivers for thermally comfortable design are the GLA's Overheating Mitigation Hierarchy and Building Regulations Part O 2021. The following diagram outlines the strategy employed on the scheme and how overheating has been mitigated in line with this hierarchy. As stated within policy, all developments must make reasonable endeavours to mitigate overheating risks and ensure cooling demands are managed to prevent excessive energy consumption from air-conditioning systems.

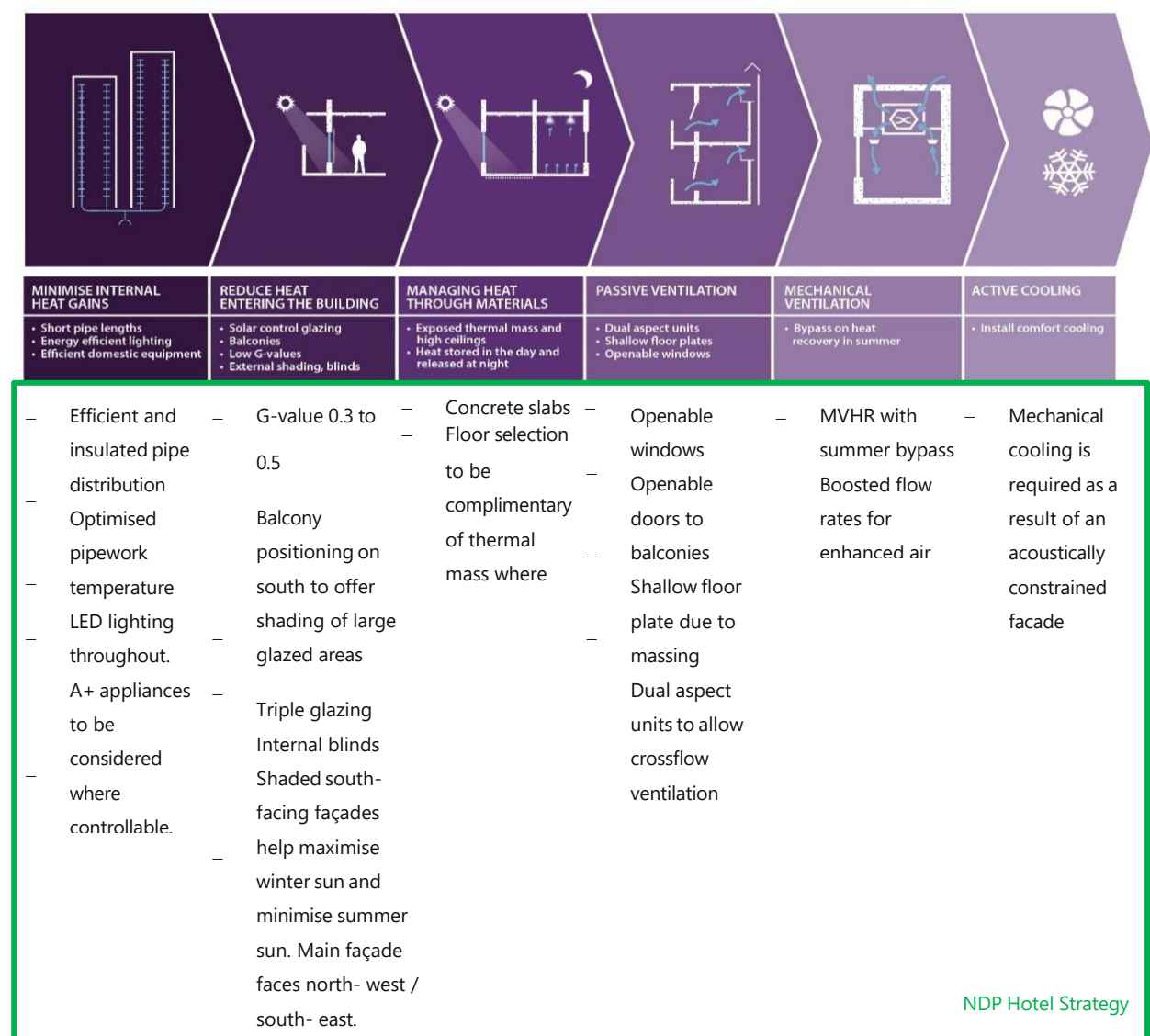


Figure 11—1 Overheating mitigation strategy

11.2 Dynamic Thermal Modelling

Dynamic thermal modelling has been undertaken to help direct the façade design and determine any residual overheating risk. Two sample floors were modelled with the higher risk units on the south-east, south and south-west included. Currently, there is minimal surrounding shading from other buildings to the critical orientations of east, south and west. The future buildings proposed to the east have been excluded to account for a worst-case overheating scenario. The image below shows the dynamic 3D overheating model in IES.

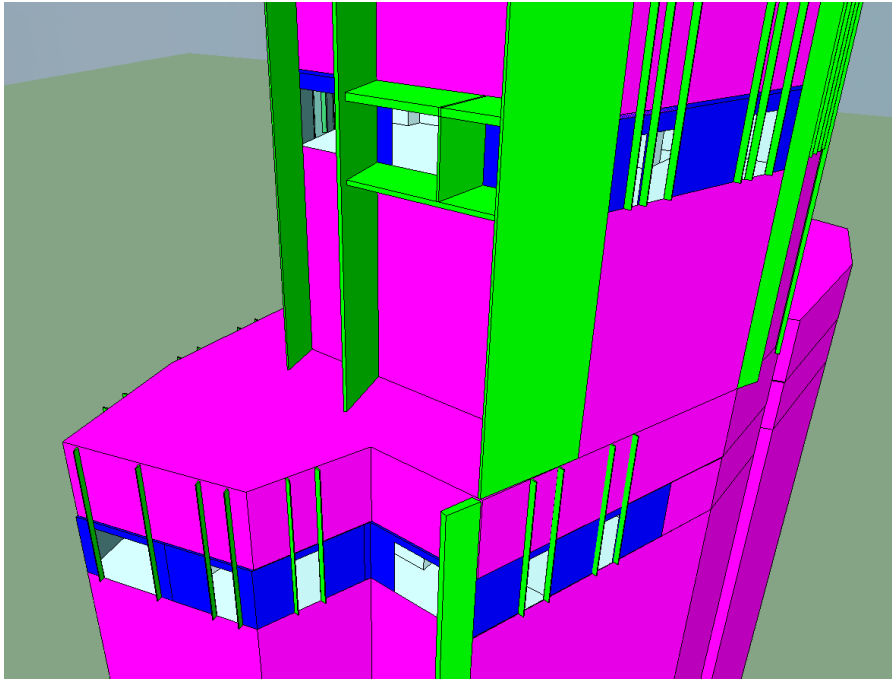


Figure 11—2 Dynamic 3D overheating model in IES

As per GLA guidance, an “unconstrained” façade has been modelled in the first instance to show the performance without any acoustics constraints. Operable windows are modelled fully open with an openable area of 80% and an opening angle of 90°. Balcony sliding doors are modelled with a 45% openable area. In all cases the window opening schedule follows Part O, condition 2 where the windows open, day and night, starting when indoor temperatures exceed 22°C and are fully open at or above 26°C. In all cases, the windows are not considered easily accessible and thus pose no security risk at night or when then residence is unoccupied. The results below show that all spaces comply with the TM59 thermal comfort requirements when window openings are unconstrained.

Table 11—1 Unconstrained façade TM59 overheating results using London_LHR_DSY1_2020High50

Room Name	Hours occupied	Hours exceeded	Hours exceeded (%)	Criterion a	% Hours < 26C	Criterion b	TM59 Result
S-E-suite_bedroom1	3672	0	0.0	Pass	0.52	Pass	Pass
S-E-suite_bedroom2	3672	0	0.0	Pass	0.58	Pass	Pass
S-E-suite_Living(D)	1989	6	0.4	Pass	N/A	N/A	Pass
S-W-suite_bedroom3	3672	84	2.1	Pass	0.61	Pass	Pass
S-W-suite_bedroom2	3672	74	1.9	Pass	0.61	Pass	Pass
S-W-suite_bedroom1	3672	54	1.4	Pass	0.67	Pass	Pass
S-E-suite_kitchen	1989	3	0.2	Pass	N/A	N/A	Pass
S-W-suite_living	1989	49	2.9	Pass	N/A	N/A	Pass

Further modelling using DSY2 and DSY3 weather files shows that nearly all spaces pass TM59 thermal comfort criteria with the exception of the living room in the south-west suite which fails criterion a in DSY3. Future installation of ceiling fans may be an option to further mitigate overheating in all spaces; however, given significant acoustic constraints, the required active cooling will mitigate overheating.

Table 11—2 Comparison of domestic TM59 results using an unconstrained façade and DSY1, DSY2 and DSY3 London weather files

Room	DSY 1			DSY 2			DSY 3		
	% Hours exceeding CAT II PASS = (< 3%)	Bedroom % Hours < 26C PASS = (< 1%)	TM59 Result	% Hours exceeding CAT II PASS = (< 3%)	Bedroom % Hours < 26C PASS = (< 1%)	TM59 Result	% Hours exceeding CAT II PASS = (< 3%)	Bedroom % Hours < 26C PASS = (< 1%)	TM59 Result
S-E-suite_Bedroom1	0.0	0.52	Pass	0.0	0.49	Pass	0.4	0.76	Pass
S-E-suite_Bedroom2	0.0	0.58	Pass	0.2	0.49	Pass	0.8	0.76	Pass
S-E-suite_Living	0.4	-	Pass	0.8	-	Pass	1.9	-	Pass
S-W-suite_Bedroom3	2.1	0.61	Pass	1.8	0.49	Pass	2.9	0.76	Pass
S-W-suite_Bedroom2	1.9	0.61	Pass	1.7	0.49	Pass	2.7	0.79	Pass
S-W-suite_Bedroom1	1.4	0.67	Pass	1.3	0.55	Pass	1.9	0.79	Pass
S-E-suite_Kitchen	0.2	-	Pass	0.5	-	Pass	1.4	-	Pass
S-W-suite_Living	2.9	-	Pass	2.9	-	Pass	4.2	-	Fail

Building Regulation Part O 2021 has introduced a requirement not to exceed noise levels at night-time within bedrooms. Acoustic modelling has demonstrated that the noise levels of the location will require night-time acoustic attenuation to bedrooms to comply with the criteria. The acoustician's report confirms that all facades will be affected by noise restrictions on bedrooms and hotel rooms. Façade constraints have been modelled separately below to show

the impact of installing acoustic louvres, by limiting the openable free area. Results demonstrate that bedrooms cannot be maintained within the TM59 comfort range.

Furthermore, unfortunately, Acoustic Louvres do not provide significant enough attenuation from event-day noise from the stadium, even when closed, which rules out their application. Full details are available in the acoustics report. This also applies to living room and kitchen spaces where compliance can be demonstrated with TM59 comfort conditions. Table 11—2 demonstrates the failure of TM 59 criterion b in all tested bedroom spaces with windows constrained to a 10° opening angle, which itself does not protect adequately against noise. In addition, one living room fails as a secondary effect of the bedroom window constraints.

Table 11—2 Acoustically constrained façade in residential bedrooms, TM59 overheating results for DSY 1.

Room Name	Hours occupied	Hours exceeded	Hours exceeded (%)	Criterion a	% Hours < 26C	Criterion b	TM59 Result
S-E-suite_bedroom1	3672	0	0	Pass	1.74	Fail	Fail
S-E-suite_bedroom2	3672	16	0.4	Pass	1.61	Fail	Fail
S-E-suite_Living(D)	1989	13	0.7	Pass	-	N/A	Pass
S-W-suite_bedroom3	3672	118	3.2	Fail	1.28	Fail	Fail
S-W-suite_bedroom2	3672	113	3.1	Fail	1.55	Fail	Fail
S-W-suite_bedroom1	3672	81	2.2	Pass	1.77	Fail	Fail
S-E-suite_kitchen	1989	8	0.4	Pass	-	N/A	Pass
S-W-suite_living	1989	66	3.3	Fail	-	N/A	Fail

To resolve the residual overheating risk, as result of an acoustically constrained façade, mechanical cooling will be implemented. Nonetheless, openable windows will still be provided to give occupants control and choice of their environment. Mechanical systems will ensure that cooling is not activated whilst windows are open. The residential and hotel rooms are comfort cooled with summer setpoints in line with CIBSE Guide A at 21-25C for all living spaces. Bathrooms are not cooled, but are within the temperature controlled areas.

12 Policy Compliance Summary

The compliance matrix in the table below has been produced to summarise and provide clarity on the performance of the development against the requirements of building regulations and planning policy.

The proposed development is compliant with almost all policy requirements. Where compliance is not achieved this is only due to significant design constraints from the building typology and local area as summarised in the Notes column.

Table 12—1 Policy compliance matrix

Document	Policy	Performance target	Compliance	Notes
LBH Strategic Policies 2013 with alterations adopted July 2017	SP4 Working towards a low carbon Haringey	Residential - 25% reduction in carbon emissions (on Part L 2013 Baseline) through on-site measures	Yes	Exceeded through compliance with London Plan Policy SI 2
		Non-domestic - achieve minimum BREEAM rating of 'Very Good', with aspiration for 'Excellent'	Yes	As set out in Sustainability Statement
		Site-wide net-zero carbon (regulated)	Yes	Cash-in-lieu carbon offset payment calculated using GLA Carbon Emissions Reporting Tool
		Promote low- and zero-carbon energy generation	Yes	Proposed connection to existing Energetik DEN and roof-mounted PV array
LBH Development Management DPD (adopted July 2017)	DM22 Decentralised Energy	Promote provision and use of Decentralised Energy Network infrastructure	Yes	Proposed connection to existing Energetik DEN
London Plan 2021	SI 2 Minimising greenhouse gas emissions	Residential - 10% reduction in carbon emissions (against Part L 2021 Baseline) through energy efficiency measures alone (Lean)	Yes	As demonstrated in carbon emissions results in energy hierarchy summary section
		Residential - Overall 35% reduction in carbon emissions (against Part L 2021 Baseline) through on-site measures	Yes	As demonstrated in carbon emissions results in energy hierarchy summary section
		Non-domestic - 15% reduction in carbon emissions (against Part L 2021 Baseline) through energy efficiency measures alone (Lean)	No	Unfeasible to achieve due to energy demand dominated by domestic hot water load because of building typology

Document	Policy	Performance target	Compliance	Notes
		Non-domestic - Overall 35% reduction in carbon emissions (against Part L 2021 Baseline) through on-site measures	No	Unfeasible to achieve as carbon emissions reductions from DEN are not accounted for in methodology.
		Site-wide - 35% overall carbon reduction through on-site measures	Yes	As demonstrated in carbon emissions results in energy hierarchy summary section
		Maximise on-site renewable energy generation	Yes	Maximum feasible area of roof-mounted PV array proposed
		Net-zero carbon' (regulated) through offset of residual carbon emissions	Yes	Cash-in-lieu carbon offset payment calculated using GLA Carbon Emissions Reporting Tool
	SI 3 Energy Infrastructure	Select heat source in accordance with the Heating Hierarchy to prioritise decentralised energy networks	Yes	Connection to existing Energetik DEN proposed
	SI 4 Managing heat risk	Reduce the potential for internal overheating and reliance on air conditioning systems	Partial	Compliance demonstrated in 'unconstrained' window opening scenario but acoustic constraints mean mechanical cooling is required

Appendix A – SAP Worksheets

Appendix B – BRUKLs

See sperate files entitled as follows, as these PDF files are security protected and cannot be combined:

- Appendix B - GREEN_brukl_P05.pdf
- Appendix B - LEAN_brukl_P05.pdf

Appendix C – DEN Correspondence

Appendix D - Good Homes Alliance Early Stage Overheating Risk Tool

Appendix E - PV Specification

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