3 Duke Street,

Richmond, TW9

Energy Statement

Job No: 5386

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Contents

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1.0 Introduction

1.1 This Energy Statement has been prepared to support a planning application for the proposed redevelopment of the site at 3 Duke Street, Richmond, TW9 1HP.

1.2 The report assesses the predicted energy performance and carbon dioxide emissions of the proposed development in the context of local and London-wide policy requirements and best practice methods.

1.3 The methodology used to demonstrate the effects of the proposed energy efficiency measures is the 4-stage Energy Hierarchy expounded by the London Plan, Policy SI 2.

1.4 Emissions reductions are shown for the proposed scheme at each of these stages and the strategy underpinning them is detailed in the relevant sections of the report.

1.5 The overarching position within these policies is that major developments should achieve net zero carbon through the following three stages.

  1.5.1 Residential development should achieve a 10% reduction in regulated emissions through energy efficiency measures.

  1.5.2 On site regulated emissions should be reduced by at least 35%

  1.5.3 There is a benchmark target of reducing emissions by at least 50%.

  1.5.4 The remaining emissions should be offset in accordance with the Borough's established carbon offset fund.

2.0 Project Summary

2.1 The proposal is to extend above the existing single storey building on the site to provide 1no. new two-bedroom and 3no. one-bedroom residential dwelling apartments across the erection of three additional storeys.

2.2 All proposed units have been included in the energy calculations to allow for the best understanding of climate impact of the building.

3.0 Policy Requirements and Drivers

3.1 The relevant planning policy documents for this site, relating to energy are:

3.1.1 National Planning Policy Framework (NPPF 2021)

- NPPF 11a - Plans should promote sustainable development that seeks to: meet the development needs of their area; align growth and infrastructure; improve the environment; mitigate climate change and adapt to its effects.
- NPPF 154 - New development should be planned in ways that can help to avoid increased vulnerability to the range of impacts arising from climate change and reduce greenhouse gas emissions, such as through its location, orientation and design.
- NPPF 155 - Help increase use and supply of renewable and low carbon energy through providing a positive strategy for energy from these sources, consider suitable areas for renewable and low energy sources and identify opportunities for the development to draw its energy supply from decentralised, renewable or low carbon energy supply.
- NPPF 157 – In determining planning applications, local planning authorities should expect new development to: comply with any development plan policies on requirements for decentralised energy supply unless it can be demonstrated that this is not feasible or viable, and take account of landform, layout, building orientation, massing and landscaping to minimise energy consumption.

3.1.2 The London Plan (2021)

3.1.3 LBRuT Sustainable Construction Checklist.

- Smaller residential schemes must achieve a 35% reduction in CO2 emissions over a Building Regulations Part L baseline.

3.2 It is our understanding that the new Richmond Local Plan will be adopted in Winter 2024/25.

3.3 In light of these policy requirements and through the developer and design team's commitment to reducing the impact of the development on the environment, this report sets out some of the measures that will be adopted to meet the policy targets.

4.0 Energy Strategy and Approach

4.1 The London Plan document titled "Energy Assessment Guidance", updated in June 2022 updated to take into account of the update to building regulations 2021. This provides the parameters by which Energy Statements should be formulated and the approach to be adopted.

4.2 The four stages of the hierarchy are referred to as Be Lean (Use Less Energy), Be Clean (Supply Energy Efficiently), Be Green (Use Renewable Energy) and Be Seen (Monitor, verify and report on energy performance).

4.3 The Be Lean stage of the hierarchy requires that developments must initially reduce the energy demand of the building through architectural and building fabric measures (passive design) and energy efficient services (active design).

4.4 The second part of the Hierarchy (Be Clean), is interested in the how their energy systems will exploit local energy resources and supply energy efficiently and cleanly to reduce CO_2.

4.5 The third stage is the addition, where feasible to introduce renewable technology, which may include Heat pumps (Air and Ground), PV panel, Solar Hot Water panels and Wind Power.

4.6 The Be Seen stage of the assessment will ensure that the whole life cycle of the building will maintain low Carbon Emissions.

4.7 The first stage of this process is to establish the baseline emissions on which the reductions will be based.

4.8 This is done using SAP (Standard Assessment Procedure) for residential buildings.

5.0 Baseline Emissions

5.1 The baseline emissions on which reduction figures are based are calculated using SAP for residential buildings.

5.2 SAP calculates a notional building using the baseline Building Regulations parameters and represents the minimum allowable standard for the energy performance of the building to meet Part L.

5.3 The parameters used are defined by the methodology and represent a target upon which improvements can be measured.

5.4 The GLA emissions reporting tool provides the baseline emissions.

5.5 The baseline emissions for each element are below.

3 Duke Street Baseline Emissions	
	SAP 10 (Tonnes CO_2/Year)
Regulated	3.1 Tonnes CO_2

Table 1: 3 Duke Street Baseline Emissions

6.0 Baseline Emissions

Notional dwelling specification for new dwellings	
Element or system	Reference value for target setting
Opening areas (windows, roof windows, rooflights and doors)	Same as for actual dwelling not exceed a total area of openings of 25% of total floor area
External walls (inc semi-exposed)	U = 0.18 W/(m^2k)
Party walls	U = 0.00
Floors	U = 0.13 W/(m^2k)
Roofs	U = 0.11 W/(m^2k)
Opaque Door (Less than 30% glazed area)	U = 1.0 W/(m^2k)
Semi-glazed door (30-60% glazed area)	U = 1.0 W/(m^2k)
Windows and glazed with greater than 60% glazed area)	U = 1.2 W/(m^2k) Frame factor = 0.7
Roof windows	U = 1.2 W/(m^2k), when in vertical position (for correction due to angle see specification in SAP 10 appendix R)
Rooflights	U = 1.7 W/(m^2k), when in horizontal position (for correction due to angle see specification in SAP10 appendix R)
Ventilation system	Natural ventilation with intermittent extract fans
Air Permeability	5 m^3 /(hm^2) at 50 Pa
Main heating fuel (space and water)	Mains gas
Boiler	Efficiency, SEDBUK 2009 = 89.5%
Heating system controls	Boiler interlock, Erp Class V Either: -Single storey dwelling in which the living area is greater than 70% of the total floor area: programmer and room thermostat -Any other dwelling: time and temperature zone control. Thermostatic radiator valves
Hot water system	Heat by boiler (regular or combi as above) Separate time control for space and water heating
Wastewater heat recovery	All showers connected to WWHR, including showers over baths Instantaneous WWHR with 36% recovery efficiency utilisation of 0.98
Hot water cylinder	If cylinder, declared loss factor = 0.85 x (0.2+ 0.051 $V^{2/3}$)kWh/day Where V is the volume of the cylinder in litres
Lighting	Fixed lighting capacity (lm) = 185 x total floor area Efficacy of all fixed lighting = 80 lm/W
Air conditioning	None
Photovoltaic (PV) system	For houses: kWp = 40% of ground floor area, including unheated spaces/ 6.5 For flats: kWp = 40% of dwelling floor area/ (6.5 x number of storeys in block System facing south-east or south west

Table 2 – Notional Dwelling Specification

6.0 Be Lean Strategy

6.1 The next stage, once the baseline has been established, is to make improvements within the "Be Lean" category. This includes improving the U Values and the reduction of thermal bridging.

6.2 Gas combi boilers with an 89.5% efficiency have been assumed at this stage.

6.3 Electrical lighting also represents a significant energy use within a building. 100% low energy lighting is proposed to reduce emissions. The proposed lighting for the development will have an efficacy of 100 lumens per circuit watt.

6.4 It is proposed that Mechanical Ventilation with Heat Recovery (MVHR) will be installed. It will have an efficiency of 88% and a specific fan power of 0.65.

6.5 Improved thermal bridging is proposed it is assumed that the Y-value will be no greater than 0.03. The PSI values for the relevant junctions will be confirmed at detailed design stage,

6.6 The proposed U-values, with the relevant Part L backstop are shown on the following page.

6.7 Following the implementation of these passive design measures including the building services the reduction in emissions at the 'Be Lean' stage have been calculated these are shown below.

6.0 Be Lean Strategy

Be Lean Fabric Specification			
Element or system	Notional Value	Proposed Value	% Improvement
External walls	U = 0.18 W/(m²k)	U = 0.18 W/(m²k)	0.0%
Party walls	U = 0.00	N/A	N/A
Roof	U = 0.11 W/(m²k)	U = 0.11 W/(m²k)	0.00%
Windows and glazed doors	U = 1.2 W/(m²k)	U = 1.2 W/(m²k)	0.00%
Air Permeability	5 m³ /(hm²) at 50 Pa	3 m³ /(hm²) at 50 Pa	40.00%
Lighting	Efficacy of all fixed lighting = 80 lm/W	Efficacy of all fixed lighting = 120 lm/W	50.00%

Table 3 – Be Lean Fabric Specification

Be Lean Emissions			
	Baseline Emissions (Tonnes CO_2/Year)	Be Lean Emissions (Tonnes CO_2/Year)	% Reduction
Regulated	3.1	2.4	21%

Table 4 - Be Lean Emissions

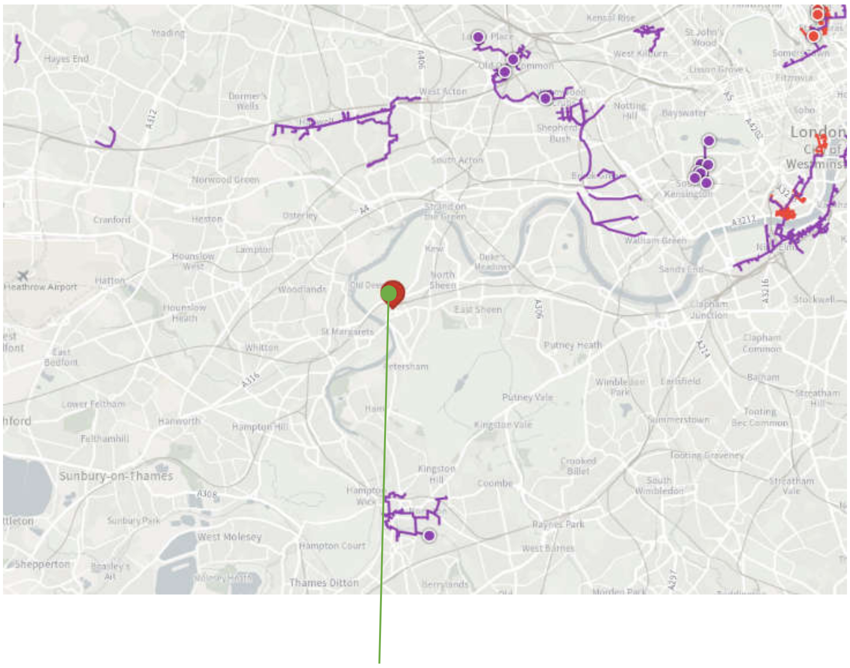
7.0 Be Clean Strategy

7.1 The Be Clean element of the hierarchy refers to supplying energy in a clean manner. This encompasses the use of energy efficient heating sources (such as heat pumps), decentralised energy and heat networks and the consideration of Combined Heat and Power.

7.2 The site does not sit within 500m of any existing or proposed decentralized energy or heating networks (as shown on the map below).

7.3 Due to the relatively small scale of the proposal, CHP is also not a viable solution. London Plan guidance suggests that CHP is most suitable for developments of at least 500 units.

7.4 As there are currently no existing opportunities to connect to a heat network, and CHP is not suitable here, no changes have been made at the Be Clean stage.



8.0 Be Green Strategy

8.1 The Be Green element of the hierarchy requires the consideration of renewable technologies to reduce emissions still further beyond the savings made at the Be Lean and Be Clean stages.

8.2 The technologies that are considered here are wind power and solar panels (photovoltaic (PV) or Solar Thermal and ground and air source heat pumps.

8.3 Wind power is not suitable in a location such as this. Wind turbines tend to perform poorly in built-up areas.

8.4 Any wind that is received on the site would be too intermittent and turbulent to provide any meaningful reduction in emissions.

8.5 Ground Source Heat Pumps are also unlikely to be a viable proposition due to the ground disturbance required in their installation.

8.6 Air Source Heat Pumps (ASHP) however are a suitable solution in this instance and provide substantial improvements in CO2 emissions when combined with a high-performing fabric such as proposed here.

8.7 It is proposed that a community ASHP with an efficiency of 380% will provide heating and hot water the development.

8.8 The heat pump will be designed to run at a temperature between 55°C and 60°C.

8.9 Photovoltaic Panels are also considered suitable for this site. It is proposed that a total of 4 kWp of PV will be installed for this development. Using 0.5kw panels, this would require two panels per apartment, a total of 8 panels. These should be positioned facing south-east where they are most effective.

8.10 The reductions in emissions at the Be Green stage are shown below.

Domestic – Be Green Emissions			
	Be Lean Emissions (Tonnes CO_2/Year)	Be Green Emissions (Tonnes CO_2/Year)	% Reduction
Regulated	2.4	0.7	56%

Table 5 – Be Green Emissions

9.0 Summary of Results

9.1 The tables below give the percentage improvement in emissions at each stage of the hierarchy and the overall savings made over Part L of the Building Regulations.

9.2 The development will be provided with increased U values (as shown above), and a communal ASHP.

9.3 The figures below have been calculated using the GLA carbon emission reporting tool and show the total CO2 emissions expected.

3 Duke Street	CO_2 Emissions (Tonnes)	% Reduction
Baseline (Part L 2022)	3.1	
After energy demand reduction	2.4	21.00%
After heat network / CHP	2.4	0.00%
After renewable energy	0.7	56.00%
Total Savings	2.4	77.00%

Table 6 – Carbon emissions savings at each stage of the Energy Hierarchy

10.0 Conclusions

10.1 This Energy Statement has been produced to accompany an application for the redevelopment of the site at 3 Duke Street to show how the site will meet the policy requirement of achieving 35% reduction in emissions through the Be Lean, Be Clean, Be Green hierarchy.

10.2 In doing so, preliminary SAP calculations have been undertaken using the information available and sensible assumptions on construction and M&E parameters.

10.3 The baseline figures have been calculated and improvements made to the fabric and plant proposed for the scheme.

10.4 The measures proposed are detailed above summarise at Be Lean as

  10.4.1 Significant fabric improvements
  10.4.2 MVHR
  10.4.3 Good air tightness

10.5 The measures proposed at Be Green can be summarised as

  10.5.1 Community ASHP
  10.5.2 PV panels

10.6 The results in Section 10 show that a reduction of 77% of regulated CO2 emissions is achieved, using the GLA's carbon emission reporting spreadsheet. This greatly exceeds the target and provides room for changes should they be required through the detailed design process.

10.7 The requirement for a 10% improvement at the Be Lean stage has also been achieved.

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Appendix A – GHA Overheating Calculation

EARLY STAGE OVERHEATING RISK TOOL

Version 1.0, July 2019

Good Homes Alliance

This tool provides guidance on how to assess overheating risk in residential schemes at the early stages of design. It is specifically a pre-detail design assessment intended to help identify factors that could contribute to or mitigate the likelihood of overheating.

The questions can be answered for an overall scheme or for individual units. Score zero wherever the question does not apply. Additional information is provided in the accompanying guidance, with examples of scoring and advice on next steps.

Find out more information and download accompanying guidance at goodhomes.org.uk/overheating-in-new-homes.

KEY FACTORS INCREASING THE LIKELIHOOD OF OVERHEATING | **KEY FACTORS REDUCING THE LIKELIHOOD OF OVERHEATING**

Geographical and local context

#1 Where is the scheme in the UK? See guidance for map	South east	4	4
	Northern England, Scotland & NI	0	
	Rest of England and Wales	2	

#2 Is the site likely to see an Urban Heat Island effect? See guidance for details	Central London (see guidance)	3	
	Grtr London, Manchester, B'ham	2	3
	Other cities, towns & dense sub-urban areas	1	

#8 Do the site surroundings feature significant blue/green infrastructure? Proximity to green spaces and large water bodies has beneficial effects on local temperatures; as guidance, this would require at least 50% of surroundings within a 100m radius to be blue/green, or a rural context	1	1

Site characteristics

#3 Does the site have barriers to windows opening? - Noise/Acoustic risks - Poor air quality/smells e.g. near factory or car park or very busy road - Security risks/crime - Adjacent to heat rejection plant	**Day** - reasons to keep all windows closed	8	4
	Day - barriers some of the time, or for some windows e.g. on quiet side	4	
	Night - reasons to keep all windows closed	8	0
	Night - bedroom windows OK to open, but other windows are likely to stay closed	4	

#9 Are immediate surrounding surfaces in majority pale in colour, or blue/green? Lighter surfaces reflect more heat and absorb less so their temperatures remain lower; consider horizontal and vertical surfaces within 10m of the scheme	1	0
#10 Does the site have existing tall trees or buildings that will shade solar-exposed glazed areas? Shading onto east, south and west facing areas can reduce solar gains, but may also reduce daylight levels	1	0

Scheme characteristics and dwelling design

#4 Are the dwellings flats? Flats often combine a number of factors contributing to overheating risk e.g. dwelling size, heat gains from surrounding areas; other dense and enclosed dwellings may be similarly affected - see guidance for examples	3	3
#5 Does the scheme have community heating? i.e. with hot pipework operating during summer, especially in internal areas, leading to heat gains and higher temperatures	3	0

#11 Do dwellings have high exposed thermal mass AND a means for secure and quiet night ventilation? Thermal mass can help slow down temperature rises, but it can also cause properties to be slower to cool, so needs to be used with care - see guidance	1	1

#12 Do floor-to-ceiling heights allow ceiling fans, now or in the future? Higher ceilings increase stratification and air movement, and offer the potential for ceiling fans	>2.8m and fan installed	2	1
	> 2.8m	1	

Solar heat gains and ventilation

#6 What is the estimated average glazing ratio for the dwellings? (as a proportion of the facade on solar-exposed areas i.e. orientations facing east, south, west, and anything in between). Higher proportions of glazing allow higher heat gains into the space	>65%	12	
	>50%	7	4
	>35%	4	

#7 Are the dwellings single aspect? Single aspect dwellings have all openings on the same facade. This reduces the potential for ventilation	Single-aspect	3	0
	Dual aspect	0	

#13 Is there useful external shading? Shading should apply to solar exposed (E/S/W) glazing. It may include shading devices, balconies above, facade articulation etc. See guidance on "full" and "part". Scoring depends on glazing proportions as per **#6**		Full	Part	
	>65%	6	3	
	>50%	4	2	1
	>35%	2	1	

		Openings compared to Part F purge rates			
#14 Do windows & openings support effective ventilation? Larger, effective and secure openings will help dissipate heat - see guidance		= Part F	+50%	+100%	
	Single-aspect	minimum required	3	4	3
	Dual aspect		2	3	

TOTAL SCORE 11 = Sum of contributing factors: 18 *minus* Sum of mitigating factors: 7

High 12 Medium 8 Low

score >12:
Incorporate design changes to reduce risk factors and increase mitigation factors
AND Carry out a detailed assessment (e.g. dynamic modelling against CIBSE TM59)

score between 8 and 12:
Seek design changes to reduce risk factors and/or increase mitigation factors
AND Carry out a detailed assessment (e.g. dynamic modelling against CIBSE TM59)

score <8:
Ensure the mitigating measures are retained, and that risk factors do not increase (e.g. in planning conditions)