Energy Statement

37 THE DRIVE, ICKENHAM

SEPTEMBER 2022

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Contents

1. EXECUTIVE SUMMARY

1..1 This report outlines the energy strategy for the proposed development at 37 The Drive, Ickenham in line with the requirements set out by the London Plan, the London Borough of Hillingdon Local Plan (2012). The proposed development comprises of the construction of 2no. 5 bed houses.

1..2 The Hillingdon Local Plan Policy EM1 requires all new residential and non-domestic developments to achieve carbon emission reductions in line with the London Plan's energy hierarchy and promotes zero carbon developments.

CO2 emissions reductions via the Energy Hierarchy

1..3 The methodology used to determine the expected operational CO2 emissions for the development is in accordance with the London Plan's Energy Hierarchy as outlined below.

- **Be Lean** - The first step addresses reduction in energy demand, through the adoption of passive and active design measures. The proposed energy efficiency measures include levels of insulation beyond Building Regulation requirements, low air tightness levels, efficient lighting as well as energy saving controls for space conditioning and lighting.

- **Be Clean** - No existing or proposed community heating networks were noted in close proximity to the proposed scheme. Due to the small size of the proposed scheme no assessments have been undertaken to demonstrate how it may be capable of connecting to a district heat network at a future date. In addition, a CHP unit was not considered feasible due to small scale of the development and the large plant space that would be required. Therefore, no CO2 emissions savings have been noted within the 'Be Clean' stage of the energy hierarchy.

- **Be Green** - The renewable technologies feasibility study carried out for the development identified PV and air source heat pumps for the site. With ASHP being the chosen technology to proceed with.

1..4 The regulated CO2 emissions reduction is presented within Table 1.

Table 1: Site-wide - CO2 emissions compared to Part L (2021) baseline

Site-wide – Carbon dioxide emissions (Tonnes CO2/year)			
	Regulated CO2 emissions (37A) (tonnesCO2/yr)	**Regulated CO2 emissions (37B) (tonnesCO2/yr)**	**Regulated CO2 emissions (Combined) (tonnesCO2/yr)**
Part L Baseline	2.49	2.54	5.03
Be green: following renewable energy appraisal	0.84	0.85	1.69

1..5 The proposed scheme is shown to achieve a site-wide regulated CO2 emissions reduction of 66.42%, through the use of energy efficient building fabric and efficient systems. Therefore, it is set to hit the regulated CO2 emissions reduction target of at least 50% set for all new residential developments within Hillingdon Council's Local Plan using the energy hierarchy of the London Plan.

2. INTRODUCTION

2..1 GreenBuild Consult has been commissioned to prepare an Energy Statement for the proposed development at 37 The Drive, within the London Borough of Hillingdon.

2..2 This report presents the energy appraisal of the proposed development and outlines the features that have been incorporated into the design proposal to decrease energy use and carbon dioxide emissions in line with the requirements of the London Plan and Hillingdon Council's local policies.

2..3 In line with the above, a reduction in regulated CO2 emissions against a Building Regulations Part L1 (2021) notional figure will be required, to ensure a policy compliant scheme. The methodology used to determine the anticipated regulated CO2 emissions is in accordance with the London Plan's three-step Energy Hierarchy (Policy SI 2);

- **Be Lean**; use less energy – Reduce the energy demand of a scheme via the adoption of an energy efficient building fabric and services strategy.
- **Be Clean**; supply energy efficiently – Delivery energy efficiently to a development by connecting to existing District Heat Networks or site energy centre consisting of CHP or CCHP units.
- **Be Green**; use renewable energy – Utilise appropriate renewable or low carbon technologies to offset grid-based energy use within the proposed development.

Site Proposal

2..4 The proposed scheme is to be located to the rear of an existing house on The Drive, which is located in within the London Borough of Hillingdon.

2..5 The proposal comprises of 2, 3 storey 5 bedroom houses.

2..6 The project is also in close proximity to major transport links, being located on The Drive which has easy access to the A40 with close access to the M40. The location of the proposed site and adjacent buildings are highlighted in Figure 1 and a proposed First Floor plan is shown in Figure 2.

Figure 1 Proposed Site Location Plan

Figure 2: Proposed Plot 37A Plans

Figure 3: Proposed Plot 37B Plans

3. POLICY & LEGISLATIVE CONTEXT

3..1 There are several national policy drivers for energy efficiency and reduced carbon dioxide (CO2) emissions, which have been introduced to address the issue of global warming and the implications of climate change including the Energy White Paper, National Planning Policy Framework (NPPF) and Building Regulations Approved Document Part L (2013 edition). On a regional level, the London Plan provides the policy drivers for major developments within Greater London and at the local level the relevant policies are within Hillingdon Council's Local Plan: 2012. For the purpose of completeness and comprehension policies have been quoted in full. However, some policies apply to major developments only, and are not applicable to this minor development.

National Policy Drivers

National Planning Policy Framework

3..2 The National Planning Policy Framework (NPPF) was adopted in March 2012, setting out a key part of the Government's reforms to make the planning system less complex and more accessible, whilst protecting the environment and promoting sustainable growth. The NPPF supersedes the previous national planning guidance, namely the Planning Policy Statements and Planning Policy Guidance Notes.

3..3 At the heart of the NPPF is a 'presumption in favour of sustainable development', which requires Local Authorities as part of any plan-making or decision-making to provide clear guidance on how the presumption should be applied locally. In addition, the NPPF sets out twelve core land-use planning principles that the Government has identified that underpin both plan-making and decision-making. Of these, the following has been identified as being relevant to energy:

'Support the transition to a low carbon future in a changing climate, taking full account of flood risk and coastal change, and encourage the reuse of existing resources, including conversion of existing buildings, and encourage the use of renewable resources (for example, by the development of renewable energy).'

Regional Policy Drivers

The London Plan 2021

3..4 The London Plan (2021) is the overall strategic plan for London, setting out an integrated economic, environmental, transport and social framework for the development of London over the next 20–25 years. The latest version of the London Plan replaces previous ones and was published for use on 2nd March 2021.

3..5 Section 9 'Sustainable Infrastructure' of the London Plan covers the mitigation of and adaptation to climate change and the management of natural resources. While most of these policies are applicable to major developments only, some are applicable to minor developments such as single dwellings in line with the London Borough of Hillingdon Local Plan 2012. The key policies regarding climate change mitigation and adaptation which are applicable to the proposed scheme are presented as follows.

Policy SI 2 Minimising Greenhouse Gas Emissions

A - 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 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.*

B – Proposals should include a detailed energy strategy to demonstrate how the zero-carbon target will be met within the framework of the energy hierarchy.

C - Residential development should achieve 10 per cent. Where it is clearly demonstrated that the zero-carbon target cannot be fully achieved on-site, any shortfall should be provided, in agreement with the borough, either:

1) *through a cash in lieu contribution to the borough's carbon offset fund, or*
2) *off-site provided that an alternative proposal is identified, and delivery is certain.*

Policy SI 3 Energy infrastructure

This policy should not be applicable to minor developments, it has also been confirmed there are no CHP, communal or district networks available to connect to in the area.

Policy SI 4 Managing heat risk

A - Development proposals should minimise adverse impacts on the urban heat island through design, layout, orientation, materials and the incorporation of green infrastructure.

Local Policy Drivers

Hillingdon Local Plan: 2012

Policy EM1: Energy and Carbon Reduction

The Council will ensure that climate change mitigation is addressed at every stage of the development process by:

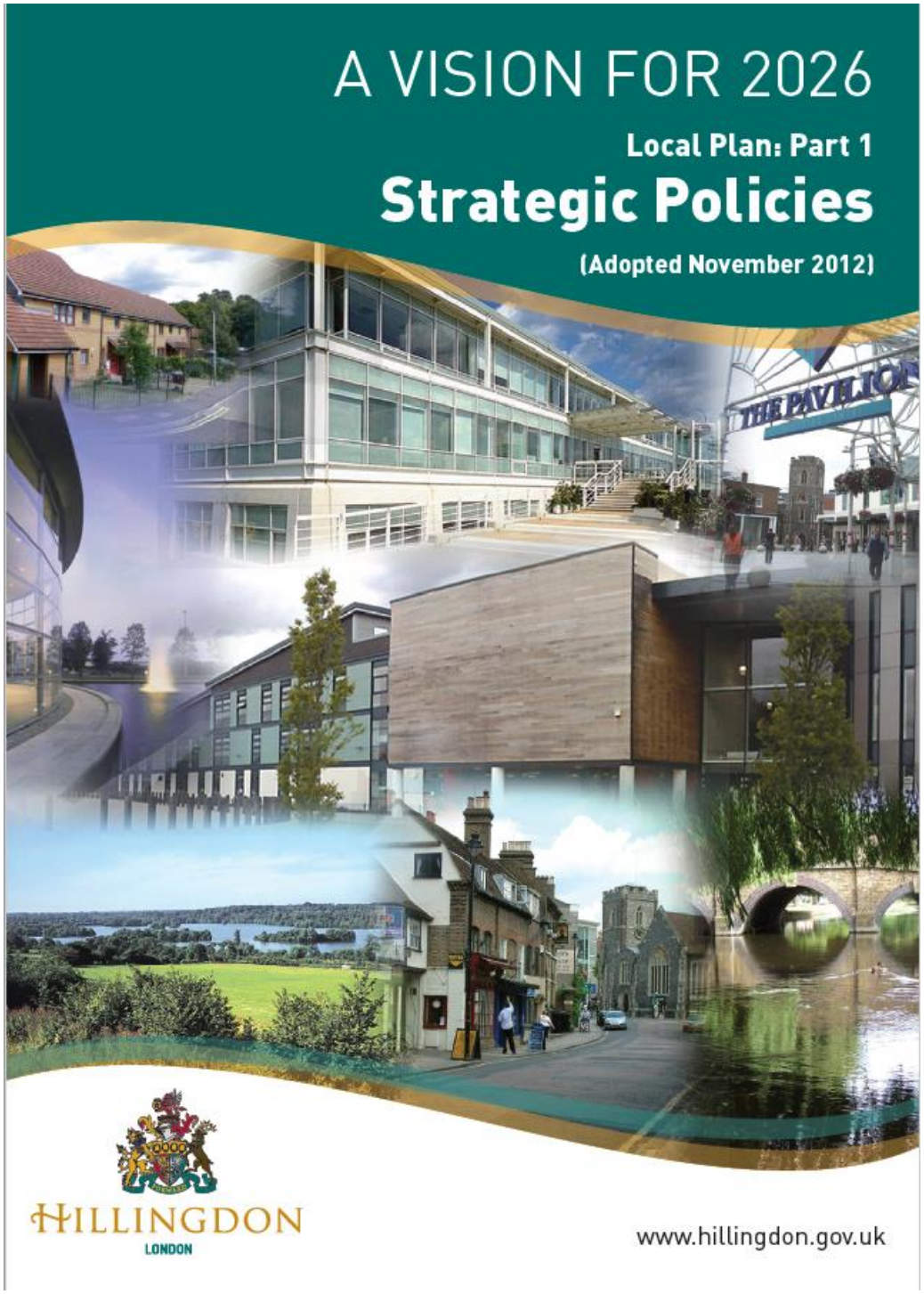
1. Prioritising higher density development in urban and town centres that are well served by sustainable forms of transport.
2. Promoting a modal shift away from private car use and requiring new development to include innovative initiatives to reduce car dependency.
3. Ensuring development meets the highest possible design standards whilst still retaining competitiveness within the market.
4. Working with developers of major schemes to identify the opportunities to help provide efficiency initiatives that can benefit the existing building stock.
5. Promoting the use of decentralised energy within large scale development whilst improving local air quality levels.
6. Targeting areas with high carbon emissions for additional reductions through low carbon strategies. These strategies will also have an objective to minimise other pollutants that impact on local air quality. Targeting areas of poor air quality for additional emissions reductions.
7. Encouraging sustainable techniques to land remediation to reduce the need to transport waste to landfill. In particular developers should consider bioremediation as part of their proposals.
8. Encouraging the installation of renewable energy for all new development in meeting the carbon reduction targets savings set out in the London Plan. Identify opportunities for new sources of electricity generation including anaerobic digestion, hydroelectricity and a greater use of waste as a resource.
9. Promoting new development to contribute to the upgrading of existing housing stock where appropriate.

The Borough will ensure that climate change adaptation is addressed at every stage of the development process by:

10. Locating and designing development to minimise the probability and impacts of flooding.
11. Requiring major development proposals to consider the whole water cycle impact which includes flood risk management, foul and surface water drainage and water consumption.
12. Giving preference to development of previously developed land to avoid the loss of further green areas.
13. Promoting the use of living walls and roofs, alongside sustainable forms of drainage to manage surface water run-off and increase the amount of carbon sinks.
14. Promoting the inclusion of passive design measures to reduce the impacts of urban heat effects.

3..6 The Hillingdon Local Plan refers to the London Plan when addressing the topic of reducing CO2 emissions from all proposed developments and mitigating climate change. The following policies within the document are applicable to all schemes within the borough.

Figure 4: Hillingdon Local Plan 2012 document



4. METHODOLOGY

4..1 The methodology used to estimate the energy demand from the building at the site has been informed by the following publications:

- The London Plan (2021)
- National Calculation Methodology (NCM) modelling guide
- Energy Assessment Guidance – GLA guidance on preparing energy assessments as part of planning applications (June 2022)

4..2 The software used to generate the Regulation baseline is approved by the DCLG as being compliant with the NCM.

4..3 As of July 2022, applicants are required to use updated SAP 10 emission factors. The carbon factors used in our calculations are as follows;

- Grid Natural Gas: 0.210 kgCO2/kWh
- Grid Electricity: 0.136 kgCO2/kWh

As the calculations have been carried out in Stroma SAP10 then there has been no need to convert any figures.

On-Site Carbon Savings – The Energy Hierarchy

4..4 The methodology employed to develop the energy strategy for the scheme and achieve on-site carbon savings is in line with the GLA's Guidance on preparing energy assessments and is as follows:

- The baseline CO2 emissions are first established, i.e. the emissions of a scheme that is compliant with Part L (2021) of the Building Regulations. The updated GLA Guidance (2020) indicates that an improvement of 10% over Part L 'notional' CO2 emissions must be shown for domestic schemes, in line with the New London Plan (2020).

- The software used to model and calculate the energy performance and carbon emissions of the domestic scheme is Stroma SAP10, by modelling all dwellings in the proposed development.

- The same approach is followed to determine the energy performance and CO2 emissions of the proposed scheme for each of the steps of the Energy Hierarchy. The CO2 emissions are estimated based on the Dwelling Emission Rate (DER) figures. The Energy Hierarchy aims at delivering significant carbon savings on-site.

4..5 The steps of the Energy Hierarchy applicable to the proposed scheme are:

- **Be Lean** - whereby the demand for energy is reduced through a range of passive and active energy efficiency measures.
- **Be Clean** - whereby as much of the remaining energy demand is supplied as efficiently as possible (e.g. by connecting to a district energy network or developing a site-wide CHP network); and
- **Be Green** - whereby renewable technologies are incorporated to offset part of the carbon emissions of the development. The uptake of renewable technologies is based on feasibility and viability considerations, including their compatibility with the energy system determined in the previous step.

4..6 As the local Policy CC1 indicates that the energy hierarchy is to be used to minimise energy use, the 'Be Seen' category of the energy hierarchy is not being applied to this minor development.

4..7 The implementation of the Energy Hierarchy determines the total regulated carbon savings that can be feasibly and viably achieved on site. The % improvement against the baseline emissions is compared to the relevant targets for each element.

5. ENERGY ASSESSMENT

'Be Lean' – Reduce the Energy Demand

5..1 In order to achieve a building that improves upon the baseline compliance threshold of Part L (2021), the proposal incorporates a range of passive and active design measures that will reduce the energy demand for space conditioning, hot water and lighting. The 'Be-Lean' measures alone aren't enough to pass the full Part L check but as the DPER isn't met we would recommend that renewable tech is needed as reviewed in the 'Be Green' section of the report, of these ASHP's have been found to be the most appropriate.

Passive Design Measures

Improved U-values

5..2 The heat loss of different building fabric elements is dependent upon their U-value. A building with low U-values provides better levels of insulation and reduced heating demand during the cooler months. The proposed development will incorporate high levels of insulation for all solid elements and high-performance glazing beyond Part L 2021 targets and notional building specifications, in order to reduce the demand for space conditioning (heating and cooling) as far as possible.

5..3 Table 2 presents the improved performance of the proposed building fabric beyond the Building Regulations requirements for the proposed scheme.

Table 2: Proposed building fabric U-values

Building Fabric U-value comparison with Part L (2021) recommendations			
Element	**Sub-Element**	**Building Regulations Part L**	**Proposed Scheme**
Walls	All External Walls	0.26	0.18
Floor	Ground Floor	0.18	0.13
Roof	All Roof Types	0.16	0.11
Windows	All Windows	1.6	1.2
Doors	Patio Doors	1.6	1.2
Doors	Front Door	1.6 (Pedestrian doors)	1.0 (half glazed entrance door)

Air Tightness

5..4 Heat losses that occur due to air infiltration can be minimised via good construction detailing and the use of best practice construction techniques. The proposed development will aim to improve upon the Part L1A (2021) minimum standard for air tightness of 8m³/m².h at 50Pa, by targeting an air permeability rate of **3 m³/m².h** at 50Pa for all areas.

Thermal Bridging

5..5 It is envisaged that the construction details for the proposed dwelling will be designed to comply with a similar performance to previous Accredited Construction Details, minimising heats losses through the junctions if the building.

Reducing the Need for Artificial Lighting

5..6 The development has been designed to maximise daylight as much as possible, as a way of improving the health and wellbeing of its occupants. All habitable areas will benefit from large areas of glazing to increase the amount of daylight within the internal spaces where possible. This is expected to reduce the need for artificial lighting whilst delivering pleasant, healthy spaces for occupants.

Active Design Measures

Energy Efficient lighting

5..7 Low energy light fittings will be incorporated throughout the development. All light fittings will be specified as LED luminaires only as shown in Table 3. This will enable the proposal to reduce energy use and internal gains as much as possible.

Building Energy Monitoring

5..8 The development will incorporate smart meters monitoring the consumption of energy and water, either directly or indirectly (using third-party equipment or software) of all areas of the proposed scheme.

5..9 In addition, comprehensive metering of the proposed heating system will future proof the scheme for changes in the energy market, including enabling the occupier / building owner to take advantage of a 'demand side' response strategy.

Reducing Overheating Risks

5..10 The potential risk of overheating will be mitigated as far as possible by incorporating passive and active design measures, in line with London Plan (2021) Policy SI 4 and its cooling hierarchy.

The Cooling Hierarchy

Energy Efficient Pipework

5..11 The heating infrastructure of the proposed dwelling will be designed to reduce the lateral lengths of pipework, which will be sufficiently insulated (following CIBSE CoP1 guidelines), thereby increasing the energy efficiency of the services design and reducing internal heat gains within the development.

Glazing Properties

5..12 As a means of reducing unwanted solar heat gains, glazing to the properties will be solar control glazing with a solar transmittance 'g-value' not exceeding 0.63.

External & Internal shading

5..13 Although not included within the dynamic simulation modelling undertaken for the scheme, it is assumed that building occupants will install internal blinds to further reduce the amount of heat entering their spaces.

Thermal Mass

5..14 It is envisaged that the internal floors of the building will provide a degree of thermal massing to absorb and store excess heat during the hottest periods of a day. The building will release its heat in the cooler times of a day to dampen the peak diurnal weather conditions.

Table 3: Building Services Inputs

Residential Building Services Inputs	
Ventilation Strategy	Natural Ventilation
Heating	Air Source Heat Pump - VWL105/6A230VS2 used
	Controls – Time and temperature zone control
Hot Water System	From main heating system – 188L cylinder used
Lighting	100% energy efficient lighting

'Be Clean' – Supply Energy Efficiently

5..15 The energy system for the development has been selected in accordance with the London Plan decentralised energy hierarchy. The hierarchy listed in Policy SI 3 states that energy systems should consider:

- Communal heating
- Site wide CHP network; and,
- Connection to existing of future proposed heating networks.

Communal Heating

5..16 Local heat and power sources minimise distribution and achieve greater efficiencies when compared to separate energy systems, thus reducing CO2 emissions. In communal energy system. Energy in the form of heat, cooling and/or electricity is generated from a central source and distributed via a network of insulated surrounding residences. However, no communal energy centres have been identified in close proximity to the proposed site see Figure 5.

Site Wide CHP Network

5..17 Combined Heat and Power generation (CHP), or co-generation, is the production of electricity and useful heat from a single engine. Unlike conventional electricity generation, heat is re-used in a CHP system, primarily for hot water, thereby improving the overall energy conversion from 25-35% to around 80%.

5..18 A CHP unit is not considered feasible for the proposed development due to its size and the plant space that would be required. Therefore, it has not been included within the proposed scheme at 37 The Drive.

Connection to an Existing Network

5..19 The London Heat Map identifies existing and potential opportunities for decentralised energy projects in London. It builds on the 2005 London Community Heating Development Study. An excerpt from the London Heat Map can be seen in Figure 5.

5..20 No existing or proposed heat networks have been noted in close proximity to the proposed scheme at 37 The Drive.

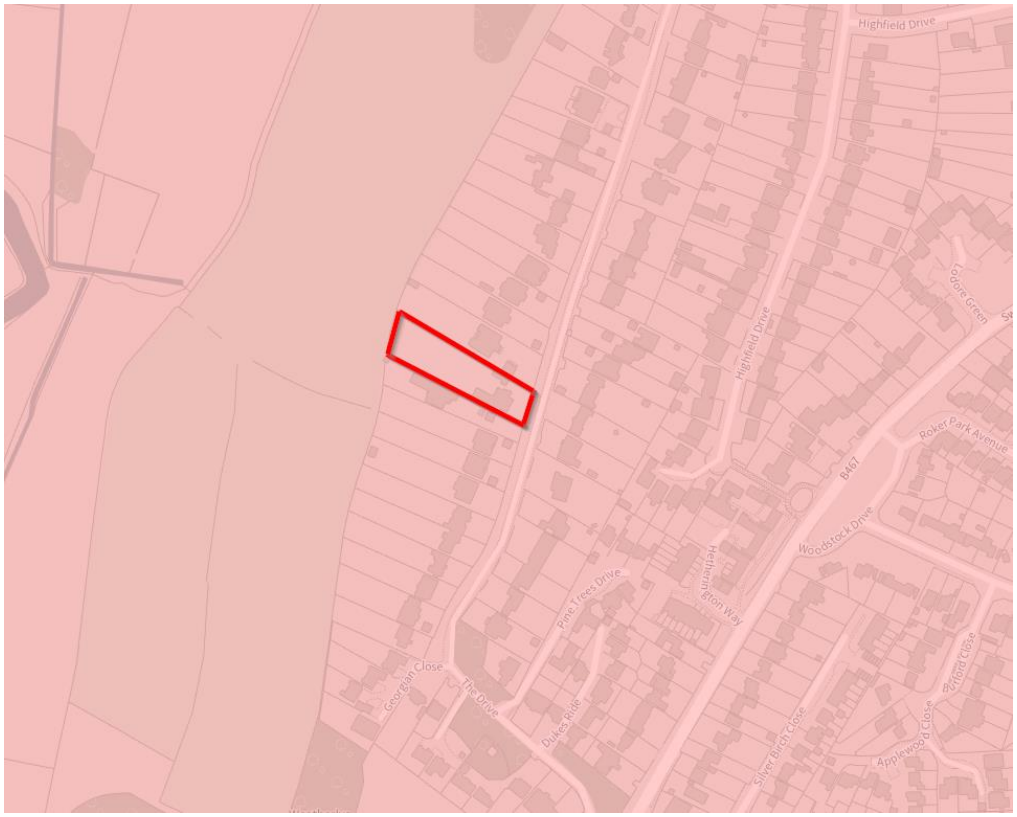


Figure 5: 37 The Drive - Location in London Heat Map

'Be Clean' Stage - Energy Use & CO2 Emissions Performance

5..21 As no connection to a district or communal heating system or site-wide CHP system is proposed, no regulated CO2 emissions saving can be noted at this stage.

Be Green' – Use Renewable Energy

5..22 Methods of generating on-site renewable energy have been assessed, once Lean and Clean measures have been considered. The proposed development will benefit from an energy efficient building fabric which will reduce the energy consumption of the proposed development in the first instance. In addition, a range of renewable technologies were considered, including:

- Biomass;
- Photovoltaic panels
- Solar thermal panels
- Ground source heat pump;
- Air source heat pump; and
- Wind energy.

5..23 In determining the appropriate renewable technology for the site, the following factors were considered:

- CO2 savings achieved;
- Site constraints;
- Any potential visual impacts, and,
- Compatibility with the energy loads of the proposal.

Renewable Energy Appraisal

5..24 Table 4 summarises the factors considered in determining the appropriate renewable technologies for this project. This includes estimated capital cost, anticipated lifespan, level of maintenance and level of impact on external appearance. The final column indicates the feasibility of the technology in relation to the site conditions. It is important to note that the information provided is indicative and based upon early project stage estimates.

Table 4: Renewable energy feasibility table

Technology Considered	Comments	Estimated Lifespan	Maintenance	Impact on external appearance	Overall feasibility
Biomass	Burning of wood pellets releases high NOx emissions and there are limitations for their storage and delivery within an urban location.	20 yrs.	High	High	Not feasible
PV	Roof space of development allows PV panels to be laid on the south-west facing roof, with minimal overshadowing.	25 yrs.	Low	Medium	Feasible
Solar thermal	Additional plumbing and kit requirement too significant to warrant effective CO2 emissions reductions from solar thermal array.	25 yrs.	Low	Medium	Feasible – but discarded due to building services integration
GSHP	The site does not have enough space to allow for the installation of ground loops.	20 yrs.	Medium	Low	Not feasible
ASHP	There is sufficient outside space to accommodate air source heat pump condenser units.	20 yrs.	Medium	Medium	Feasible
Wind	Wind turbines located at the site will have a significant visual impact on the existing building.	25 yrs.	Medium	High	Not feasible

'Be Green' Stage - Energy Use & CO2 Emissions Performance

5..25 The 'Be Green' stage energy calculations have been carried out with consideration for the use of ASHP's.

ASHP's

5..26 ASHPs were considered to enable a further carbon reduction for the proposed scheme beyond any reductions achieved by fabric.

5..27 Table 5 presents the site-wide CO2 emissions for the proposed scheme when compared to the Part L baseline and 'Be Lean' calculation figures, while Table 6 presents the resulting regulated CO2 emissions savings at the 'Be Green' stage of the GLA's energy hierarchy.

Table 5: Be Green Stage: Site-wide - CO2 emissions compared to Part L (2021) baseline

Site-wide – Carbon dioxide emissions (Tonnes CO2/year)		
	Regulated CO2 emissions (TonnesCO2/year) (37A)	**Regulated CO2 emissions (TonnesCO2/year) (37B)**
Part L Baseline	2.49	2.54
Be Green: following renewable energy appraisal	0.84	0.85

Table 6: Green Stage: Site-wide – Regulated CO2 emissions savings

Site-wide – Regulated carbon dioxide savings				
	Savings (TonnesCO2/year) (37A)	**Savings (TonnesCO2/year) (37B)**	**Savings (%) (37A)**	**Savings (%) (37B)**
Be green: Savings from renewable energy & energy efficiency measures	1.65	1.69	66.42%	66.42%
Total Savings	**1.65**	**1.69**	**66.42%**	**66.42%**

6. CONCLUSIONS

6..1 In accordance with the London Plan, GLA guidance and Hillingdon Council's local policies, the baseline energy figures derived from Part L compliant energy calculations have indicated that the proposed scheme will have a regulated CO2 emissions 'notional' baseline of 5.03 tonnes of CO2 per year (tCO2/year).

6..2 For the 'Be Clean' stage, no existing community heating system was noted in close proximity to the proposed development. A CHP unit was not considered feasible due to size and location of the development and the large plant space that would be required. Therefore, no CO2 emissions savings have been noted within the 'Be Clean' stage of the energy hierarchy.

6..3 Potential low carbon alternatives were assessed that would provide a significant CO2 emissions reduction for the 'Be Green' stage of the energy hierarchy. PV and air source heat pumps have been considered, however, due to limitations with overshadowing due to the close proximity to trees to the rear of the property it has been agreed that PV would not be viable to be used for the proposed scheme at this time.

6..4 Therefore, it can be ascertained that a significant CO2 emissions saving has been calculated for the proposed development 37 The Drive. Table 7 summarises the proposed scheme and detail the CO2 emissions and savings against the Part L baseline.

Table 7: Site-wide - CO2 emissions compared to Part L (2021) baseline

Site-wide – Carbon dioxide emissions (Tonnes CO2/year)		
	Regulated CO2 emissions (37A)	**Regulated CO2 emissions (37B)**
Part L Baseline	2.49	2.54
Be green: following renewable energy appraisal	0.84	0.85

Appendix A

Part L Compliance Documents -