70 WEST DRAYTON ROAD
LONDON, UB8 3LA

Residential Development

Energy & Sustainability Assessment

MARCH 25

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Content Page

1. SUMMARY

It is our opinion that sufficient design works have been carried out at this early stage to demonstrate that the proposal is successfully addressing the requirements of London Plan Policy S12 and the local energy policies (LP22) of the London Borough of Hillingdon.

The energy hierarchy has been adopted to follow a Be Lean, Be Clean, Be Green methodology. The preferred energy strategy is to reduce energy demand and consequently the amount of conditioning and renewable energy contribution needed. This starts with a fabric first approach to improve thermal elements and controlled fittings. The feasibility of CHP systems and decentralised energy networks have been considered within the Be Clean case.

The final Be Green improvements have additionally explored the adoption and effect of adding renewable energy. The most appropriate renewable energy source has been identified as **PV Panels** which achieves minimum of 35% carbon dioxide emission reduction as required by London Borough of Hillington.

Be Green

Reference	Be Green CO2 emission (DER)	BE Lean CO2 emisison (TER)	% Reductin over Part L 2021
Unit 1 , 70 West Drayton Road, London, UB8 3LA	10.24	16.58	38.24%
Unit 2 , 70 West Drayton Road, London, UB8 3LA	10.48	16.75	37.43%

The carbon footprint of regulated emission has been determined using the following National Calculation methodology (NCM). FSAP 10.2 – Part L1 2021

The building CO2 emissions for the development have been calculated to be improve 37.84% beyond Lean Calculations. This has been achieved through energy efficiency measures, using improved building fabric, increasing the efficiency of the building services and finally the installation of a renewable energy source.

The Clean total energy requirements and carbon dioxide emissions have been calculated taking full account of all regulated emissions (space & hot water heating, and electricity for pumps, fans, lights). The Lean calculations was determined by using the orientation and the use of building elements (walls, windows etc.) with U-values consistent with achieving compliance with Approved Document Part L1A.

2. INTRODUCTION

This Energy Assessment relates to a planning application to converting a single dwelling into 2No. semi-detached dwelling at 70 West Drayton Road, London, UB8 3LA.

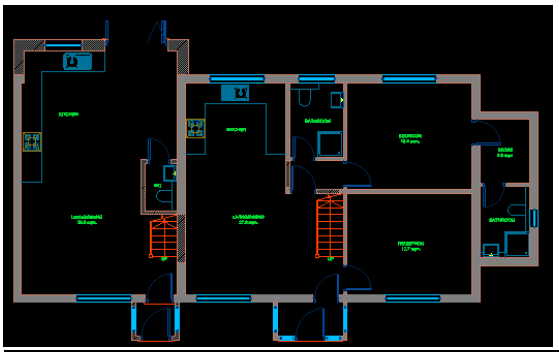
The requirement for new developments to obtain a proportion of their energy needs from on-site renewable energy sources is now a well-established feature of planning policy.

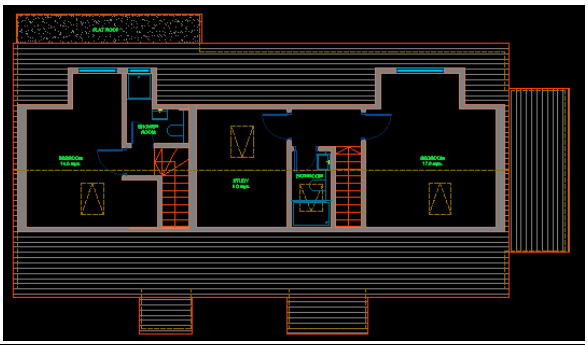
This Energy Assessment sets out the applicable policies on energy and CO2 emissions, and the methodology for and the results from an energy demand assessment.

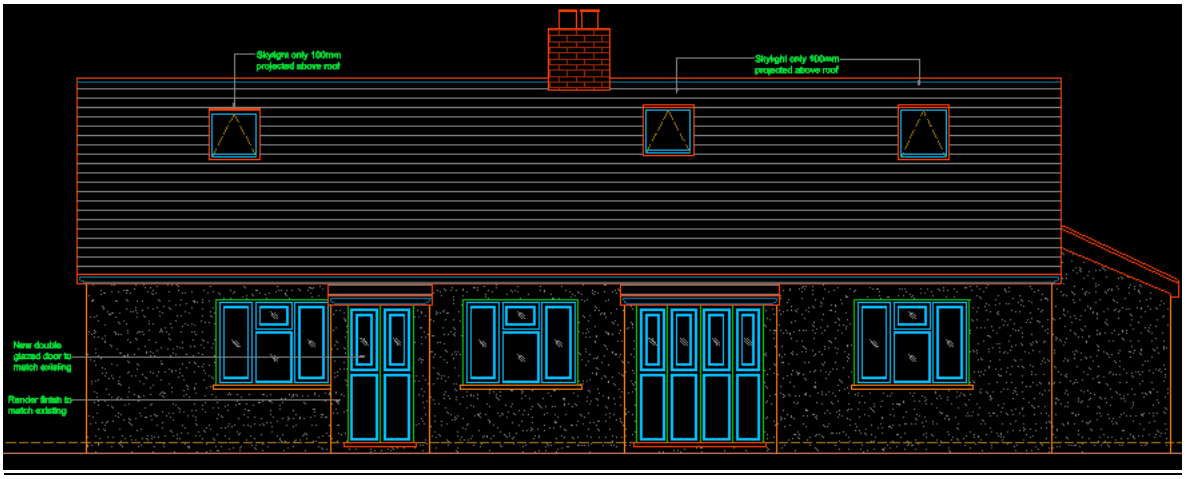
It includes an overview of possible renewable energy technologies and identifies the technology most suitable for this development and reasons why other technologies have been excluded.

In presenting the information, this Energy Assessment demonstrates that the proposed development will fully satisfy, the current applicable planning policies relating to energy conservation, and renewable energy.

A Sustainability Statement has been prepared to demonstrate a commitment to enhance the environmental performance of the development. This includes the specification of materials, waste reduction, biodiversity, and internal water use limited by design to 105 L/p/d (litres per person per day).







3. STATUTORY REQUIREDMENTS

BUILDING REGULATIONS – PART L 2021

This section of the building regulations deals with the conservation of energy in new domestic and commercial buildings; specifically the energy used for space heating/cooling, water heating, cooking, lighting and appliances. The methodology for the assessment of such has been adopted from the Building Research Establishment's Domestic Energy Model energy assessment method for the domestic dwelling.

This method requires the calculation of a target emissions rate (TER), which assumes standard or typical building components and the calculation of the buildings actual emissions (DER for SAP). It is a requirement that the building's actual emissions will be lower than the target emission rate.

"On 6 April 2014 the 2013 changes to Part L of the Building Regulations came into effect. Part L 2013 delivers an overall reduction in CO2emissions for new residential and new nondomestic buildings, with the targets for individual buildings being differentiated according to building type. This reduction in CO2emissions affected the percentage reduction necessary above the Part L 2013 regulations to meet the Mayor's targets in the London Plan.

As outlined in the Sustainable, Design and Construction SPG, since 6 April 2014 the Mayor has applied a 35 per cent carbon reduction target beyond Part L 2013 of the Building Regulations - this is deemed to be broadly equivalent to the 40 per cent target beyond Part L 2010 of the Building Regulations, as specified in Policy 5.2 of the London Plan for 2013-2016.

Detailed energy statements should be submitted as part of applications. This should demonstrate the predicted energy and associated carbon dioxide emission savings achieved through the incorporated of energy efficiency measures, decentralised energy and low/zero carbon technologies. This should be demonstrated in line with policy 5.2 of the London Plan, which requires a 35% reduction in CO2 emissions above 2010 Building Regulations covering the period up to October 2013 and 40% thereafter."

The strategy outlined in this report has aimed to achieve a 35% reduction in CO2 emissions against a Part L1A. This target has been achieved following the energy hierarchy presented in the London Plan.

NATIONAL PLANNING POLICY FRAMEWORK

The National Planning Policy Framework (NPPF) was adopted in March 2012 and updated in July 2021. The framework sets out a structure for delivering sustainable developments with relevance for energy and carbon issues.

The NPPF sets out 12 core planning principles, of which the following are directly related to sustainability:

1) Proactively drive and support sustainable economic development to deliver the homes, business and industrial units, infrastructure and thriving local places that the country needs;
2) 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);

3) Contribute to conserving and enhancing the natural environment and reducing pollution. Allocations of land for development should prefer land of lesser environmental value, where consistent with other policies in this Framework (the NPPF)

PLANNING POLICY STATEMENT 22: RENEWABLE ENERGY (ODPM, 2004) Planning Policy Assessment covers the consideration of issues relating to renewable energy technologies and their application to new developments.

Technical advice and guidance on the various individual renewable technologies and examples of good practice within development plans and developments are also available. Requirements include:

a) Renewable energy developments should be capable of being accommodated throughout England in locations where the technology is viable and environmental, economic, and social impacts can be addressed satisfactorily.
b) The wider environmental and economic benefits of all proposals for renewable energy projects, whatever their scale, are material considerations that should be given significant weight in determining whether proposals should be granted planning permission.
c) Development proposals should demonstrate any environmental, economic and social benefits as well as how any environmental and social impacts have been minimized through careful consideration of location, scale, design and other measures.

THE LONDON PLAN AND LONDON BOROUGH OF HILLINGDON.

This report has been prepared in accompaniment to a planning application for New Dwelling and a proportion of the report seeks to address policy 5.2/S12 of London Plan as well as LBRUT Core Strategy policies CP1 & CP2, also DM HD1, DM SD1 and DM SD2 of the Development Management Plan. The extract below outlines the approach for producing energy assessments as per 'Energy Planning Greater London Authority guidance on preparing energy assessments April 2015'.

LBRUT Policy LP 22 - Sustainable Design and Construction

Developers are required to incorporate measures to improve energy conservation and efficiency as well as contributions to renewable and low carbon energy generation. Proposed developments are required to meet the following minimum reductions in carbon dioxide emissions:

- All new major residential developments (10 units or more) should achieve zero carbon standards in line with London Plan policy.
- All other new residential buildings should achieve a 35% reduction.
- All non-residential buildings over 100sqm should achieve a 35% reduction. From 2019 all major non-residential buildings should achieve zero carbon standards in line with London Plan policy.

Targets are expressed as a percentage improvement over the target emission rate (TER) based on Part L of the 2013 Building Regulations. This should be achieved by following the Energy Hierarchy: Be Lean (use less energy), Be Clean (supply energy efficiently) and Be Green (use renewable energy).

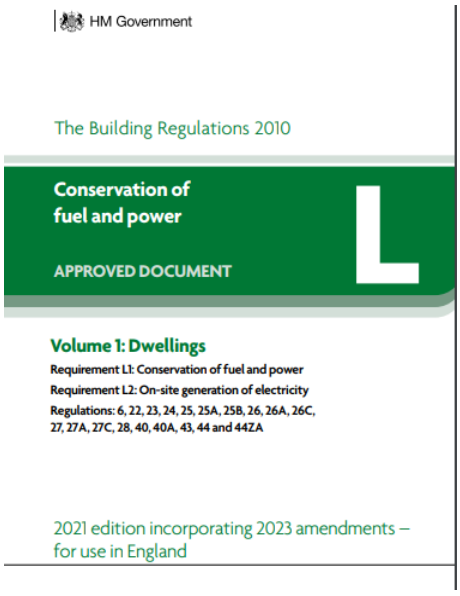
High standards of energy and water efficiency in existing developments will be supported wherever possible through retrofitting. Householder extensions and other development proposals that do not meet the thresholds set out in this policy are encouraged to complete and submit the Sustainable Construction Checklist SPD as far as possible, and opportunities for micro-generation of renewable energy will be supported in line with other policies in this Plan.

The London Plan Policy SI 2 - Minimising Greenhouse Gas Emissions

A. This means reducing greenhouse gas emissions in operation and minimising both annual and peak energy demand in accordance with the following energy hierarchy:

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

B. Residential development should achieve 10 per cent on-site reduction beyond Building Regulations, and non-residential development should achieve 15 per cent through energy efficiency measures.



4. CALCULATION METHODOLOGY

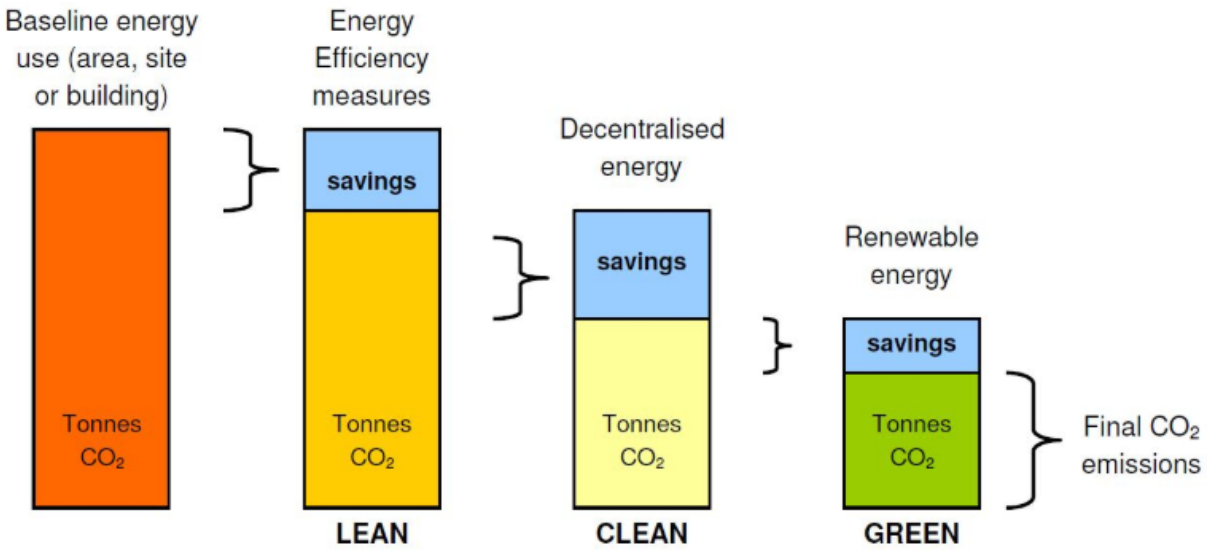
This Energy Assessment takes a standard hierarchical approach as follows:

1. Lean
A calculation of baseline energy demand demonstrates the projected annual heating, cooling and electricity demand of the development. The assessment shows the carbon dioxide emissions resulting from the predicted energy use (Dwelling Emissions Rate) and improvement of the services and fabric over the baseline calculations.

2. Clean
The feasibility of connecting to an existing or planned heat network was considered as part of this energy strategy. No existing or planned heat networks were identified within a reasonable distance of the site and the small scale of the site is not sufficient to support the inclusion of a CHP system.

3. Green
Details of renewable energy technologies to be incorporated in the development, demonstrating how much carbon dioxide emissions from expected energy use will be reduced through on-site renewable energy generation.

The starting point was to determine the performance of the "Lean" for the dwellings, using the orientation, level of insulation and the performance of building services equipment.



The Energy Hierarchy: In line with best practice, the Energy Hierarchy (as set out in the London Plan) has been adopted throughout the proposed design and the resulting CO2 savings are set out in this report.

5. BE LEAN & LE CLEAN - ENERGY DEMAND AND EFFICIENCY

The total CO2 emissions has been calculated taking into full account of energy demands for space heating, hot water, and electricity for pumps, fans, lights. The baseline was determined by using the orientation and the building elements (walls, windows etc.) with U-values and other reference values.

Target Required: Domestic

· New main wall to achieve u-value of 0.18 W/m^{2}K
· New Roof to achieve 0.15W/ m^{2}K
· New Floor to achieve 0.12W/ m^{2}K
· Windows to achieve u-value of 1.20W/ m^{2}K
· Doors to achieve 1.20W/ m^{2}K
· Highly efficient gas fired boiler
· Controls: Time and temperature zone controls, heaters
· Air pressure test 5.00 or less
· Ventilation – intermittent extract fans
· Accredited construction thermal bridging to table K1 applied

Be Clean -Improved Efficiency, building fabric and services

The following improvements have been applied to the services over the baseline(lean) calculations reducing the CO2 emissions:

Be Lean

Reference	Be Lean CO2 emission (DER)	Be Green CO2 emission (DER)	% Reduction over Lean (DER)
Unit 1 , 70 West Drayton Road, London, UB8 3LA	9.25	8.49	8.22%
Unit 2 , 70 West Drayton Road, London, UB8 3LA	9.26	8.49	8.32%

Applied Details: Domestic

· Main wall to achieve u-value of 0.16 W/m^{2}K
· Introduction of PV Panels 1.30 kWP

The tabulated calculations results are in table below. The results show the CO2 emissions from the baseline (lean) calculations.

Be Green

Reference	Be Green CO2 emission (DER)	BE Lean CO2 emisison (TER)	% Reductin over Part L 2021
Unit 1 , 70 West Drayton Road, London, UB8 3LA	10.24	16.58	38.24%
Unit 2 , 70 West Drayton Road, London, UB8 3LA	10.48	16.75	37.43%

6. OVERVIEW OF RENEWABLE ENERGY

Energy from renewable sources has been defined in Article 2 of EU Directive 2010/13/EU 'on the energy performance of buildings' and includes wind, solar, aerothermal, geothermal, hydrothermal and ocean energy, hydropower, biomass, landfill gas, sewage treatment plant gas and biogases. For the purposes of this energy Assessment and the use of renewable energy on a domestic scale these can be summarised as follows:

- Bio-fuels — combustion of solid or liquid bio-fuels to produce heat or electricity.
- Decentralised energy.
- Heat pumps — extraction of heat from the earth, atmosphere or water bodies.
- Hydroelectricity — use of water cycle driven flows to generate electricity.
- Photovoltaic — direct generation of electricity from sunlight.
- Solar thermal — direct heating of water for space heating or domestic hot water.
- Wind turbines — use of solar driven air movement to generate electricity.

The technologies and their potential application to this site are discussed in more detail in the following sections. However, one further pertinent point must be made. The reason for adopting renewable energy technologies is to reduce greenhouse gas emissions, mainly carbon dioxide, and none of the technologies are wholly "zero carbon". This is because, when the whole life cycle is taken into account some energy has to be put into every system to manufacture and maintain the equipment (which has a finite life) or to operate the equipment, and generally at present this energy is derived from non-renewable sources. Examples include the energy needed to refine and process the silicon used to manufacture photovoltaic panels, the diesel fuel used to transport wood pellets and to power the wood processing machinery for the production of wood fuel pellets.

Finally, due to the dynamic and innovative nature of the renewable energy technology industry even apparently similar products can differ in vital practical details which means that detailed design of installations must be undertaken by experts, often working closely with the product manufacturers, as virtually no two products are identical or interchangeable.

The following sections contain a summary of each possibly applicable technology, and a comparison of the advantages and disadvantages of technologies relevant to this development.

5.1 DECENTRALISED ENERGY
Not considered suitable for this development.

5.2 BIO-FUELS
Not considered suitable for this development.

5.3 AIR SOURCE HEAT PUMPS

A new technology which works very well in new build development. The ASHP can be used to provide both the hot water and heating for the dwelling.

Not considered a suitable for this development due to noise.

5.4 Ground source heat pumps
Not considered suitable for this development.

5.5 HYDROELECTRICITY
Not considered suitable for this development.

5.6 PHOTOVOLTAIC

Photovoltaic (PV) systems use areas of semiconductor material that produce electricity when exposed to light. They are connected to the building electricity supply via an inverter which converts the output to a form which is compatible with the mains electricity voltage and frequency. This also allows excess electricity to be exported at times when the actual demand from the dwellings is less than that being produced by the PV system. This ensures that all the electricity produced is used and achieves a reduction in carbon dioxide emissions. For all purposes relating to planning, the exported electricity is by convention treated as if it were used on site.

The output of photovoltaic systems is generally specified as kW peak, or kWp with each 1kWp of system expected to produce an average 800 kWh of electricity per year, although this may be reduced depending on location, orientation and over shading. The area required to produce an output of 1 kWp varies but for this exercise 6.7m2 has been used. (The developer will be required to submit a quotation and technical evaluation to ensure that the calculated quantity of panels will produce the required on site generation per annum)

Because the availability of sunlight, to produce electricity, will generally not align with demand, it is normal for the system to be connected to the electricity grid and excess production exported. The introduction of the feed-in-tariff has improved the economics of solar PV systems.

There are no direct environmental consequences from the installation of PV panels but the installation can have a visual impact that may require consideration.

Considered a suitable for this development.

5.7 SOLAR THERMAL PANELS

Solar thermal panels harness solar energy to heat domestic hot water. They are usually supplemented with the main heating system, as they can only provide a portion of the hot water demand, depending on the time of year. Overall, it is estimated that a suitably sized system can provide up to 60% of the hot water energy. Solar thermal systems require the installation of a thermal store and / or a domestic hot water cylinder. This is not currently planned for this development as it is proposed to use combination boilers to provide the heating and domestic hot water.

It is for this reason that solar thermal systems are not considered suitable for the development.

5.8 WIND TURBINES

Not considered suitable for this development.

7. CONCLUSION

This section looks at how the development can reduce overall energy usage and demand from renewable energy sources.

All possible renewable energy technologies were evaluated in relation to the site, starting with Combined Heat and Power (CHP). Most technologies were excluded because of the small scale of the development and location. One technology was identified as being most suitable for installation; the use of photovoltaic (PV) panels mounted on the roof of the development.

Therefore, In order to achieve the enhanced reduction, we propose to have 1.3 kWP of PV panels for new dwelling.

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The building CO2 emissions have been calculated to be reduced by average of 37.84% beyond Lean (DER). This has been achieved through energy efficiency measures, using improved building fabric, increasing the efficiency of the building services.

The developer will be required to submit a quotation and technical evaluation to ensure that the calculated quantity of panels will produce the required on-site generation per annum and the amount of required panels can fit on the building.

8. COOLING AND OVERHEATING

The building has been designed to be airtight and with a high performing fabric. However, other features incorporated within the design of the building mitigate against the effects of overheating.
The heat distribution system within the houses will be designed such that the heat pump internal unit is in close proximity to all hot water outlets, and the heating system will be configured with efficient pipe layouts and a short overall length. Additionally, the high thermal mass of the building will help to retain heat, and the rooms will be of slightly increased height – approximately 2.5m from floor to ceiling.

Openable windows will enable ventilation whilst the overall proportion of glazing to wall area will be kept considerably below 20%, helping to limit solar gain. This will help to reduce the need for artificial cooling in a potentially warmer future climate.

Policy 5.9 of the London Plan and Policy LP20 of the Local Plan seek to reduce the impact of the urban heat island effect in London and encourages the design of places and spaces to avoid overheating and excessive heat generation, and to reduce overheating due to the impacts of climate change.

In addition to this, unregulated energy will be reduced across the site by ensuring:

- All white goods will conform to EU energy labelling scheme.
- All lighting will be low energy, with external lighting controlled by daylight and/or PIR sensors to avoid wastage.

Summer Overheating and Cooling

With a continual drive for energy efficiency through both the Building Regulations and Local Planning Authority requirements, the risk of overheating to dwellings in the summer months is becoming more prevalent. Overheating can be a mild discomfort or a hazard to health if managed incorrectly, so it is vitally important that overheating risk be mitigated to ensure the dwelling will be both energy efficient and comfortable to live in.

Summer overheating is caused when there is excess build-up of heat within a dwelling. This can occur where there is excessive solar gain and limited means to absorb excess heat into the building fabric or purge this heat through ventilation. Summer overheating can be managed through a variety of measures and the chosen solution will vary from development to development. These measures can include:

Limiting solar gain

- Glazing g value: This is a measure of how much solar radiation penetrates the glazing. The lower the g value the less solar gain enters a dwelling. Glazing with low g values may have a darker tint to the glazing, so aesthetic considerations are also a factor. Lower g values (below 0.5) are often required in apartments with single facades. Specifying g values below 0.2 will increase cost substantially and also limit the number of available suppliers for glazing.

- Internal Shading: Blinds can be used to limit solar gain in a dwelling. They can either be automatic, triggered by the sun's presence on the window, or operated manual. Manual operation requires the occupant to be present however, so this option isn't a reliable option when trying to mitigate overheating risk.

Purging excess heat build up

- Thermal Mass: thermal mass is the measure of a dwellings ability to absorb energy. A dwelling with a high thermal mass (high proportion of concrete) has the ability to absorb heat during the day, which helps maintain a steady internal temperature. This heat can be released back into the dwelling at night time, when the temperature of the dwelling is lower, helping to maintain a consistent internal temperature.

- Ventilation: A dwelling can be ventilated to purge excess heat build-up. This can be done through openable windows, especially where cross ventilation is possible. Where ventilation through windows isn't possible, due to security, noise or pollution issues, Mechanical Ventilation can be used. The ventilation rates required to purge a dwelling can often be quite high, requiring oversized systems.

In this instance thermal mass and mechanical ventilation have been used to prevent excess heat build up.

The above measures, in conjunction with increased building fabric U Value performance, will ensure that the proposed development will comply with the requirements set in Policies 5.9 of the London Plan and LP20 of the Local Plan.

9. WATER SAVING MEASURES

Policy 5.15 B (Water Use and Supplies) of the London Plan and Local Plan Policy LP22 A (Sustainable Design and Construction) of the Local Plan state that the developer should aim to minimise the use of mains water by the following:-

A) Incorporating water saving measures and equipment;
B) Designing residential development so that mains water consumption would meet a target of 105 litres or less per head per day (excluding an allowance of 5 litres or less per head per day for external water consumption).

The scheme will include the following devices:

- Water efficient taps.
- Water efficient cisterns
- Low output showers.
- Flow restrictors to manage water pressures to achieve optimum levels.
- Water meters to all premises with guidance on water consumption and savings.

Advice will be provided to the residents through a comprehensive Home Owners Pack, detailing how to make optimum use of the devices installed around the home. Further, in marketing the scheme sustainable elements such as water reduction will be promoted.

The specification shown in Table 3 will be adopted on the development to ensure that the internal water use is reduced to a maximum of 105 litres per head per day in line with Policy Internal Water Use Assessment and is in line with Part G of Building Regulations.

The proposed flow rates criteria for the dwellings at this development shall be as follow:-

Table 3

Appliance	Fittings Flowrates / capacity
Washing Machine	17.6 litres per kg (dry load)
Dishwasher	4.5 litres per place settings
Kitchen Tap	10 litres per minute
Dual Flash WC	6 litres per flush (full) & 4 litres (half)
Bath	190 litre capacity to overflow
Basin Tap	5 litres per minute
Shower	6 litres per minute

The calculations provided within Appendix 1 demonstrate that's by using the above figures the water consumption rate of 103.4 litres per person per day can be achieved which is below the target usage level of 105 (l/p/d).