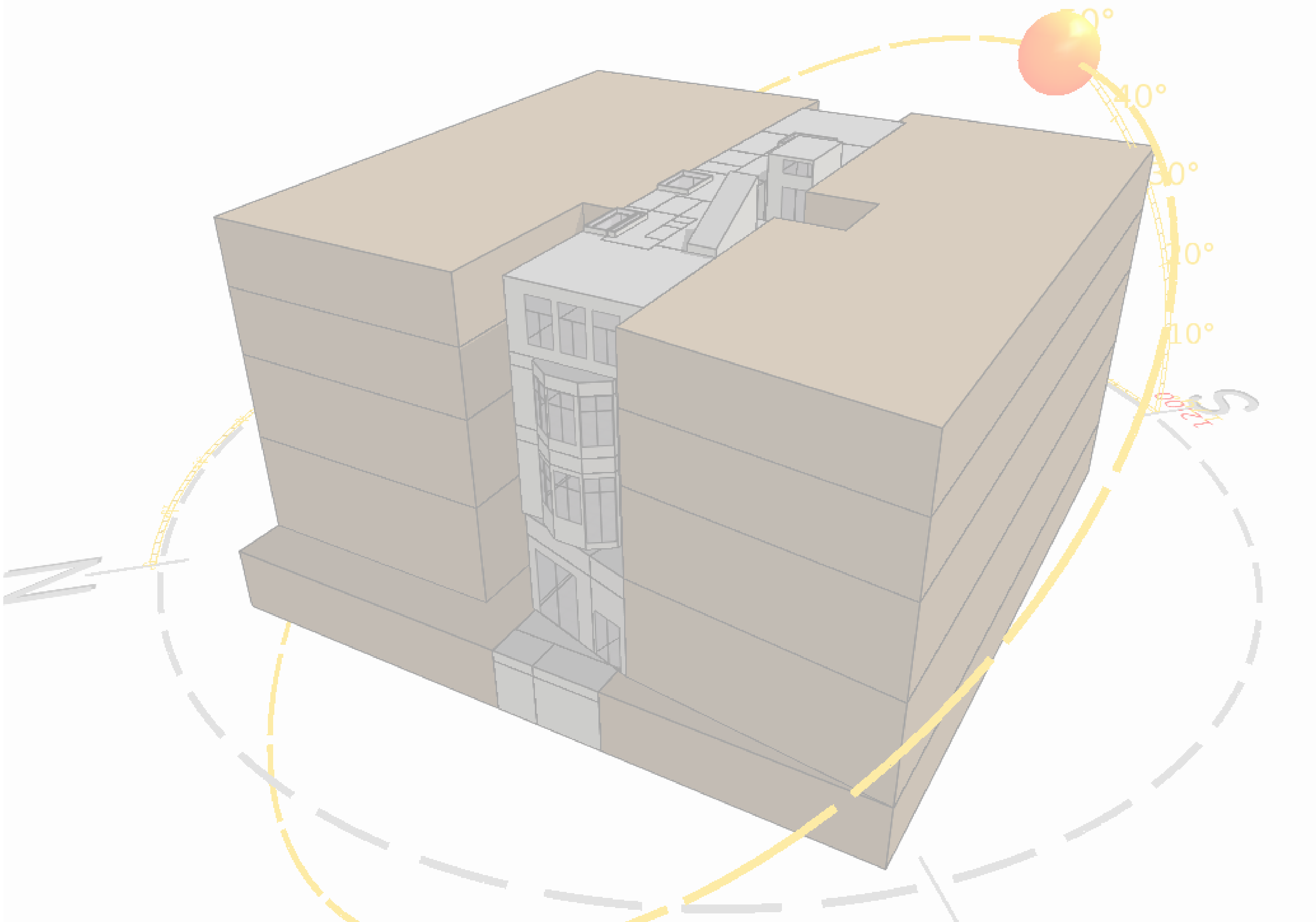
Energy Statement

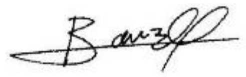
357 Euston Road/44 Warren Street

22030-MEP-ZZ-ZZ-RP-YMEP-9000



Design MEP Ltd in association with:

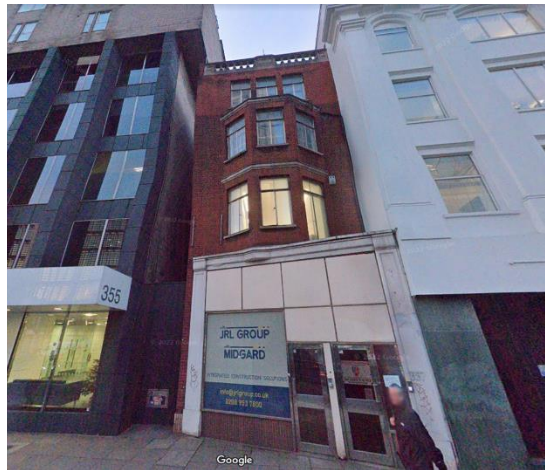
Design MEP
Registered in England 10813084
21 Wellington Street, Leicester, LE1 6HH

REV	TITLE	BY	CHECK	DATE	SIGNED
P02	Re-issued. Comments in page 7 in error to Green stage description.	Amir Bouzid	Ali Bourne Phil Pollard	27/04/2022	

REV	STAGE	DATE
P01	First issue for planning	14/02/2022
P02	First issue for planning	27/04/2022

1. Executive Summary

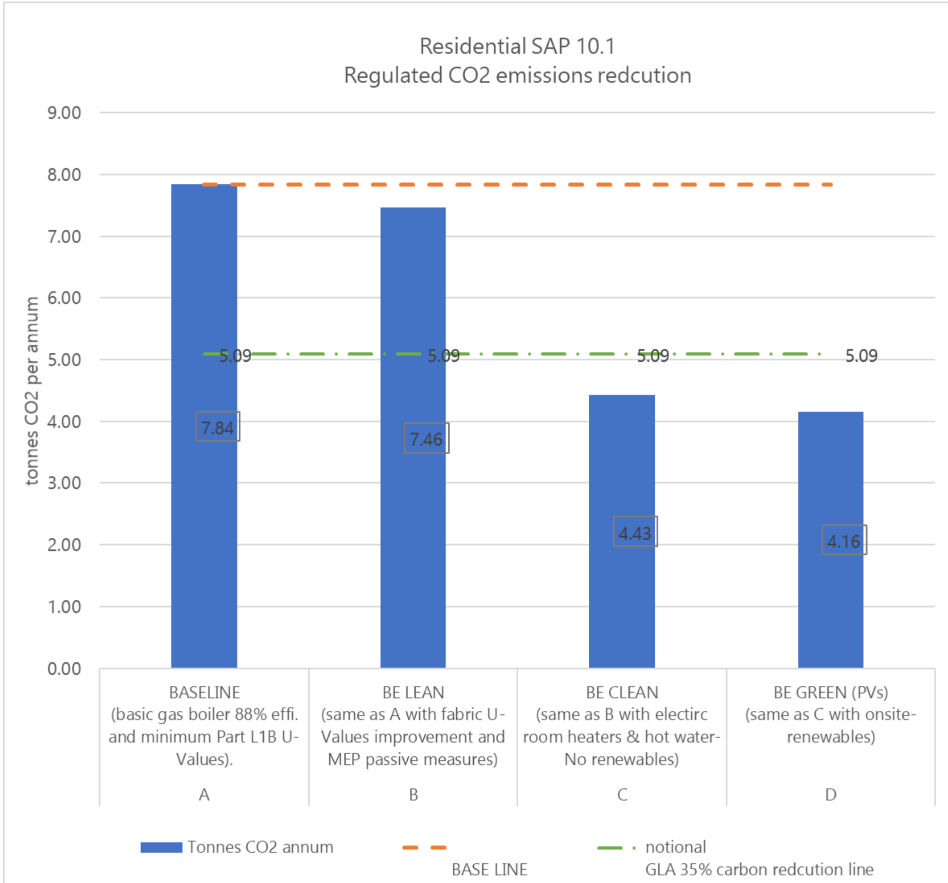
Design MEP has undertaken a preliminary energy assessment to prepare an energy statement for residential property with offices located at 357 Euston Road, London. The proposed development comprises the refurbishment of an existing building into large dwelling over three floors (370m^2) including workplace offices, meeting room and amenities in the basement and ground floor (253m2). The scheme falls within the London Borough of Camden and will address the policies set out by both the GLA and the local Plan of Camden as a minor development.



The energy assessment has been split domestic and non-domestic as required by the National Calculation Methodology (NCM). SAP assessment for the domestic part triggered energy statement requirement. The non-domestic part (offices) is below the threshold, hence not included in the energy statement assessment. The GLA energy hierarchy method shows that the proposed refurbishment delivers a cumulative total **47**% reduction in CO_2 emission, equivalent to 4 tonnes of CO2 per annum using the latest SAP 10.1 carbon factor intensities.

The following tables show the CO_2 emission carbon reduction.

Dwelling's regulated carbon dioxide savings from each stage of the energy hierarchy		
	CO2 emissions reduction Tonnes CO_2 annum	%
BE LEAN (A-B)	0.37	4.77%
BE CLEAN (B-C)	3.03	40.65%
BE GREEN (C-D)	0.27	6.10%
Combined cumulative savings E (A - D= E)	3.68	46.93%



2. Introduction

Energy assessment in this report is intended to be submitted to support planning application for a minor scheme refurbishment.

In line with Camden's Core Strategy and Camden Planning Guidance (CPG) sustainability developments, all development in Camden is expected to reduce carbon dioxide emissions by following the energy hierarchy Be lean, Be clean, Be green. See Chapters 2-6 of Camden Planning Guidance 3. Several CPG documents were adopted on the 15th of January 2021, which includes the local planning document policy "Energy efficiency and adaptation" and forms Supplementary Planning Document (SPD). They also support the Local Local Plan Policies CC1 Climate change mitigation and CC2 Adapting to climate change. Revised document replaces the Energy efficiency and adaptations CPG (March 2019).

A summary of relevant points to this project from the Energy efficiency and adaptation CPG document states the following: -

- Local Plan Policy CC1 requires all development to reduce carbon dioxide emissions through following the steps in the energy hierarchy Be lean (use less energy), Be clean (supply energy efficiently), Be green (use renewable energy).
- Page 28 of the Camden Planning Guidance states that an energy statement is to be carried out using the DER of the proposed scheme compared to a similar base line using Part L1B minimum specs.
- The Council expects proportionate measures to be taken to improve the energy performance and sustainability of existing buildings.
- All buildings being refurbished are expected to reduce their carbon emissions by making improvements to the existing building. This includes work involving a change of use or an extension to an existing property
- Residential refurbishment less than 500sqm are considered minor development.
- For residential refurbishment assessed under Part L1B, Table 2a, page 34 of the local planning guide stipulates" Greatest possible reduction - meeting Part L1B for retained thermal elements (London Plan 5.4, Local Plan CC1).
- Incorporate renewables where feasible with no compulsory minimum reduction in CO2 emissions.
- Use of passive energy efficiency measures to reduce carbon emissions, promote natural daylight and reduce summer overheating.
- There is no minimum CO_2 emission carbon reduction target for minor refurbished residential schemes to meet the GLA, instead CO_2 emissions carbon reduction to be as far as technically and economically feasible.
- It is understood from the the CPG, that there is no zero-carbon target, i.e., cash in lieu offset payment (S106 financial contribution to Camden's Carbon Offset Fund) with regards to minor size refurbishment residential schemes.
- This development does not require the assessment of the feasibility of decentralised energy network because it does not fall under the new and major development.
- "In areas of poor air quality, there is an expectation of zero emission buildings. Developers should look to priorities the installation of renewable energy technologies with no polluting emissions. These can be air, ground, or water heat pumps and potentially efficient direct electric 'point of use' heaters to supply a hot water load, unless found to be unfeasible."
- The non-domestic part of the development (offices locates in the basement and ground floors do not require to be part of the energy statement except for the normal building regulations compliance because of the floor area which is less than 500 sqm (classed as minor development).

3. Approach to Optimising Energy Use

This section summarizes the design principles that have been adopted to minimize energy consumption and improve the internal environment. Dwellings with a low energy consumption will exhibit low running costs and low carbon footprints. The energy hierarchy below has been adopted to minimise energy and carbon emissions. The strategy adopts a fabric first approach to ensure that energy use is minimized where possible, and in turn complemented if adequate by green on site renewables to further reduce the energy impacts of the building.

3.1. Be lean

3.1.1. Fabric thermal improvement

The table below shows the proposed U-Values improvement to improve the thermal performance of the existing dwelling. The proposed U-Values improvements are the minimum requirements as stipulated by Part L1B approved document for existing dwellings.

Proposed Dwelling Fabric				
Thermal Element	As existing U-Values W/m^{2}k	Base line dwelling target's U-Values W/m^{2}k	Proposed dwelling U-Values W/m^{2}k	U-Value Improvement from as existing %
External Wall	1.14	0.30	0.30	74
Roof	1.56	0.18	0.18	88
Floor	0.63	0.25	0.25	60
Windows	5.6	1.6	1.2	82
Skylights	6.6	1.6	1.6	75
Door	3	1.8	1.8	40

3.1.2. MEP passive measures

Other passive energy efficiency measures are proposed to the existing dwelling which include

- Mechanical ventilation with heat recovery
- LED low energy lighting
- New glazing with better visible light transmittance allowing higher natural daylight
- Electric immersion heaters using low carbon electricity
- Better heating controls
- Lighting control through use of PIRs sensors to reduce from lighting electricity

Be Lean	Regulated carbon dioxide savings	
	(Tonnes (CO2) per annum)	(%)
Through fabric U-Values improvements and passive MEP measures	0.37	5 %

3.2. Be Clean

Clean stage is defined in this assessment by means of of implementing low carbon fuel electricity for space heating and domestic hot water to take advantage of low carbon intensity of grid electricity. This replaces mains gas method used to define the base line and Be lean above stages. The table below shows the current carbon intensities to be used in the GLA energy strategy assessment.

There is no requirement to connect to local district heating for minor development.

Fuel carbon factor (Kg (CO2)/kWh)			
Fuel type	SAP 2012	SAP 10	SAP 10.1
Natural gas	0.216	0.210	0.216
Grid electricity	0.519	0.233	0.136

Be Clean	Regulated carbon dioxide savings	
	(Tonnes (CO2) per annum)	(%)
Savings from point of use direct acting room electricity heaters and immersion heaters hot water cylinder.	3	41%

3.3. Be green

Camden planning documents stipulates to incorporate renewables where feasible for small development. To meet this requirement a small solar photovoltaic roof system is proposed.

The proposed nominal peak power is 3 KWp, which can yield annually 2400 kWh per annum and is is equivalent to approx. 14 m2 PV area (11 panels at 275 Watts peak each module).

Appointed PV specialist to confirm final data. The proposed-on site PV system delivers a 6% CO_2 reduction.

Be green	Regulated carbon dioxide savings	
	(Tonnes (CO2) per annum)	(%)
PVs	0.27	6 %

3.4. Energy strategy summary

Residential SAP 10.1 Dwelling's (Regulated carbon emissions)		Tonnes CO_2 annum
A	**BASELINE** (basic gas boiler 88% effi. and minimum Part L1B U-Values).	**7.84**
B	**BE LEAN** (same as A with fabric U-Values improvement and MEP passive measures)	**7.46**
C	**BE CLEAN** (same as B with electirc room heaters & hot water-No renewables)	**4.43**
D	**BE GREEN (PVs)** (same as C with onsite- renewables)	**4.16**

Dwelling's regulated carbon dioxide savings from each stage of the energy hierarchy		
	CO2 emissions reduction Tonnes CO_2 annum	%
BE LEAN (A-B)	0.37	4.77%
BE CLEAN (B-C)	3.03	40.65%
BE GREEN (C-D)	0.27	6.10%
Combined cumulative savings E (A - D= E)	3.68	46.93%

4. Renewables and LZCs appraisal

In accordance with the London Plan, the technical feasibility and economic viability of installing LZC technology have been assessed in the following table.

LZC Technology	Basic Technical Information	Technical and Planning Issues	Suited Application	Site Specific Comment	Considered for detailed Assessment	Recommendation			Comments
						High	Medium	Low	
Solar hot water heating	Solar collectors (flat plate or tube) transfer energy into transfer liquid to a closed loop twin coil hot water cylinder.	Ideally located south facing roof. Approx. generation 454kWh/m²/yr. Income generated from Renewable Heat Incentive (RHI) scheme	Domestic and commercial applications with high hot water load; leisure centres, canteens, and toilets.	Shading from adjacent buildings. Not commonly used in urban London zones. Low solar radiation for short return period.	No			✓	Small annual (CO2) saving Medium capital cost Medium payback period
Photovoltaics	Converts sunlight to DC electrical power. Requires inverter to convert to AC. Income generated from Feed-in Tariff (FIT). Panels ideally inclined at 30º to the horizontal facing a southerly direction.	South facing PV array will generate approx. 750kWh/yr. per kWp (peak) Attention must be given to shading, roof loading, wind lateral forces, roof access and connection to grid.	Wide range of building types, schools, offices, hotels, dwellings etc. Feed into the dwelling for day usage or grid export Feed in tariff financial return	Careful assessment for roof area to accommodate PV system. Avoid shaded parts of the roof for maximum PV system yield. Well proved technology with good local knowledge.	Yes	✓			Medium annual (CO2) saving High capital cost High payback period
Small scale hydro power, tidal power, wave power	Small scale turbines in fast flowing rivers provide electrical power. Tidal wave platform movement generates energy.	Adequate access to owned fast flowing river source required. Detailed planning approval required for any tidal installation.	Rural and costal situations required.	No access to fast flowing rivers and site located inland.	No			✓	Medium annual (CO2) saving High capital cost Medium payback period
Wind Turbine	Turbine/generator converts wind energy to electrical power. Turbines available with outputs from 600W to 2MW. Excess electricity can be exported to the grid. Feed-in Tariff (FIT) from electricity export.	Best performance in open, non-urban locations. Can be installed on or integrated in a building. Location wind speed is the determining factor	Large sized turbines in non-urban or offshore locations will be more effective	Generally, not suitable in urban/suburban locations.	No			✓	Small annual (CO2) saving High capital cost Medium payback period

LZC Technology	Basic Technical Information	Technical and Planning Issues	Suited Application	Site Specific Comment	Considered for detailed Assessment	Recommendation			Comments
						High	Medium	Low	
Biomass Heating	Uses plant-derived organic material. Can produce heat or biogas depending on technology	Relatively low efficiency, highly carbon efficient. Issues include storage area, access, stability of fuel supply, maintenance, and air quality	Buildings with sufficient access for storage.	Insufficient storage space and access s for delivery.	No			✓	High annual (CO2) saving High capital cost Long payback period
CHP - natural gas	Generates both electricity and heat using fossil or renewable fuels.	Requires predictable and relatively constant base load power and heat loads for best performance approximate 4500 hours running.	Hotels, hospitals, leisure centres, some industrial premises.	Very small scheme to validate use of CHP	No		✓		Medium annual (CO2) saving High capital cost Medium payback period
Community Heating	Utilises waste heat from process such as large-scale power generation where most of the heating comes from waste heat.	Requires access to existing community scheme or creation of scheme to serve a large predictable energy load for viability.	Hotels, hospitals, leisure centres, some industrial premises.	district heating is currently available for connection, however prohibitive cost does not warrant connection to dwelling usage.	No			✓	Medium annual (CO2) saving High capital cost Long payback period
Air source heat pumps (ASHPs) (electricity)	A heat exchanger extracts heat from the air. The heat pump raises the temperature of refrigerant via the compression cycle and reverse for cooling. Used for space heating, hot water and cooling. Very high life (CO2) emissions reductions Vs. condensing gas-fired boiler under new SAP 10 carbon factors (clean electricity source)	Plant space required for external condensers. Noise from condensers to be considered if close to residential areas, teaching classrooms. Requires defrost cycle in extreme conditions.	All building types where heating and cooling required. Air to water suited for low temperature systems i.e., underfloor heating. Efficient use of fuel to yield heating and or cooling.	No sufficient external space required for condensers with PVs considered. Potential noise concerns to be assessed carefully for adjacent offices and residential areas. Prohibitive cost of ASHP and requirement for flow and return pipes from roof level to lower floors.	No		✓		High annual (CO2) saving Low capital cost Long payback period

LZC Technology	Basic Technical Information	Technical and Planning Issues	Suited Application	Site Specific Comment	Considered for detailed Assessment	Recommendation			Comments
						High	Medium	Low	
Ground source heat pump (electricity)	Takes up heat from the ground and releases it at high temperature. Heat can be used for space heating and domestic hot water.	Requires a large area for horizontal systems, vertical bore holes approx. 5kW required 6m diameter spacing. A licence may be required from the Environment Agency.	All building types where heating and cooling required. Air to water suited for low temperature systems i.e., underfloor heating. High (CO_2) saving under new SAP10 carbon factor.	Heating and cooling required to scheme. Insufficient external space required for vertical bore holes or ground loop due to nature of scheme's site.	No			✓	High annual (CO_2) saving High capital cost Long payback period
Water source heat pump (electricity)	Takes up heat from a local water source, lake or river and releases it at relatively low temperatures. Heat can be used for space heating and domestic hot water.	Requires a large area for water. A licence may be required from the Environment Agency	All building types where heating and cooling required. Air to water suited for low temperature systems i.e., underfloor heating.	No water course on site.	No			✓	Medium annual (CO_2) saving High capital cost Long payback period
Geothermal heat pump (electricity)	Takes up heat from a local geothermal underground course. Heat can be used for space heating and domestic hot water.	Requires access to high temperature geothermal water courses. A licence is required from environment Agency for water/energy extraction.	All building types where heating and cooling required. Air to water suited for low temperature systems i.e., underfloor heating.	No local geothermal activity.	No			✓	Medium annual (CO_2) saving High capital cost Long payback period
Fuel Cells	Fuel cells convert the energy of a controlled chemical reaction, typically involving hydrogen and oxygen, into electricity, heat, and water vapour. Fuel cell stacks operate in the temperature range 65°C – 800°C providing co- generation opportunities in the form of Combined Heat and Power (CHP) solutions.	Expensive emerging technology. Requires sufficient base and physical space to make the system viable. Does not provide energy saving but allows storage of energy for long periods to smooth consumption.	Zero (CO_2) emissions if fired on pure hydrogen and low (CO_2) emissions if fired on other hydrocarbon fuels Virtually silent operation since no moving parts High electrical efficiency Excess electricity can be exported back to the grid Benefits from being part of an energy centre/district heating scheme	Expensive Pure hydrogen fuel supply and distribution infrastructure limited in the UK Sufficient base thermal and electrical demand required Some additional plant space required Reforming process, used to extract hydrogen from alternative fuels, requires energy, lowering overall system efficiency	No			✓	High annual (CO_2) saving High capital cost Long payback period

4.1. Indicative Payback

For this report, simple payback periods are considered which are based on current assumed prices with no consideration for future value and comparing just annual savings against initial outlay.

New PV feed-in tariff as of 1st of January 2019, should be 3.87p/kWh on PV system annual yield.

The following utility costs have been assumed to assess payback periods only:

Electricity = £0.17/kWh

Assumed, PV feed-in tariff as of 1st of January 2019 @3.87p/kWh on PV system annual yield.

Assumed PV annual yield = 2400 kWh (from SAP output predicted yield)

the total investment cost is estimated at approximately £3,500 including maintenance cost.

Using a utility electricity price of 17 pence per kWh prices, the PV system will generate a cost saving from the electricity utility of £408 annually (including any maintenance costs). (From 2400 kWh x 0.17)

With an assumed PV Feed-in tariff at 3.87p/kWh if eligible, on all annual PV produced the approx. annual return is £93. (From 2400kWh x £0.0387)

5. Appendix I: Water efficiency

There is a growing concern on water shortage in the UK and in particular, in London due to long intense summers that now tend to happen. More so in London where the substantial population increase has put more pressure on declining water resources. Restrictions on water use by the local authorities on the London population will increase the water shortages particularly in summer season. Thus, it is imperative that water conservation measures are considered at earlier design stage. "Saving water, and particularly hot water (e.g., by using low flow showers), will also save energy and help to cut carbon emissions and energy bills. As buildings are increasingly fitted with water meters, saving water will also save money. "Meeting the water policy

Measures to reduce water consumption in the dwelling to no more than 125 L/person	
Minimise water demand and maximize water efficiency:-	
Leaks	Leaks detection controllers
lower flush volume toilets	This will be achieved by Low dual flush toilets: 2.5 and 4 liter flush. All the WCs will have a PIR sensor and solenoid valve which cuts the water supply if no one is present. Prevent water wastage via leaky taps
low flow showers and taps	Supply restrictor valves: Installed to keep water flows constant and prevent possible damaging leaks and water wastage and Low flow 9 liters per minute showers. Flow restricted taps to kitchen cooking facilities sink and basins
'A'-rated kitchen's appliances	Appliances for kitchen cooking facility to be low energy and low water use with A rating such as cookers and dishwashers.
Incorporated rain- and grey- water recycling where possible	Rainwater harvesting has been deemed to be unsuitable for this development due to :- Roof area not available to accommodate extra pipes due to PV systems Internal rainwater drainage making use of water butt problematic Difficulty to install a green roof as the roof area is utilized for PVs and other possible plant equipment's Expectation of very high demand on water flushing for toilets that will exceed the grey water harvested No use for water harvested for plant irrigation as no planting is proposed
Where use of ground water is proposed a license from the Environment Agency will be required; their	No use of ground water is considered in this development

advice should be sought at an early stage.	
Use of soft landscaping and planting requiring high levels of irrigation	Not considered in the development
Provide Automatic Sanitary shut-off to toilet areas using solenoid valves linked to PIRs to shut off the cold-water supply when not in use	Not applicable due to type of building (non-domestic buildings)

End of Energy Statement