55 Sheldon Avenue
London
N6 4NH

Mechanical, Electrical and Public Health Engineering Services

Stage 2 Outline Design Proposal Report

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1.0 Introduction

1.1 Project Description

55 Sheldon Avenue is located in Highgate and comprises the extension and major refurbishment of an existing residential property. The proposed property is set over four floors with a large basement which includes cinema room, study with ensuite, gym and dance studio, pool hall and other ancillary rooms.

The ground floor consists of primary living spaces with the master suite and four further bedrooms/en-suites and playroom/snug at first and second floors levels. There is also a car lift for a single vehicle.

This report outlines the proposed concept mechanical, electrical and public health (MEP) engineering systems to be installed at the property.

The purpose of the report is as follows:

- Inform the Client and the design team of the nature and implications of the engineering systems prior to commencing developed design.
- To obtain Client and design team sign off of the proposals.
- To inform the cost plan for the project.
- To set the standards for the development.
- Identify any areas which require further clarification/coordination with the design team.
- Detail the energy strategy proposed for the new development

The MEP systems will be designed to reflect the overall feel for the development and provide internal conditions commensurate of a luxury development.

Ω End of Section



2.0 Design Criteria

2.1 Scope

This section of the report sets out the design principles, which underline the proposals contained within the following sections. These principles cover the scope of services to be provided, their design criteria and also aspects of their on-going operation and maintenance.

2.2 Scope of Services

The scope of services to be provided by Cooper Homewood Ltd to which this report relates is based on the Common Arrangement of Work Sections, which are as follows:

CAWS	Services
R10	Rainwater drainage systems (Internal only)
R11	Above ground foul drainage systems
S10	Hot and cold water supply systems
S32	Natural gas supply systems
T10	Heating Systems
T20	Gas and oil fired boilers
T41	Variable refrigerant flow systems
T42	Underfloor heating and cooling systems
U10	Ventilation systems
V11	Low voltage connection
V20	Low voltage distribution systems
V31	Low voltage switchgear
V40	Small power systems
V42	Extra low voltage power supply
V50	General lighting systems (Power and wiring only)
V51	Lighting controls
W12	Audio visual systems
W20	Television and radio distribution systems
W30	Telecommunications systems
W31	Data distribution systems
W40	Door Entry Systems
W41	Intruder detection and alarm systems
W44	Closed circuit television systems
W50	Fire detection and alarm systems

2.3 Exclusion from Scope

The following items are not included and are understood to be included in the appointments of the parties indicated below. Note that this list is not exhaustive.

- The design of external rainwater design above ground will be by the architect.
- The final detailed design and coordination of all below ground drainage including any tanks will be the responsibility of the Main Contractor in line with the performance specification.
- The architect or fire engineer will be responsible for defining the fire strategy for the project. Cooper Homewood Ltd will be responsible for specifying the building engineering services works to meet the requirements of the strategy.
- Acoustic advice will be by an Acoustic Consultant appointed by others.
- A background noise survey and associated planning report will be by an acoustician appointed by others.
- The internal lighting design will be by the architect, interior designer or specialist lighting designer. The external lighting design will be by the landscape architect.
- The irrigation design will be by the landscape architect.
- Selection of sanitaryware will be by the architect and/or interior designer.
- Specification of specialist kitchen extract systems will be by others.
- Specification of the car lift will be by others.
- Specialist cooling of any wine cellars will be by others.

2.4 Design Criteria

The design criteria shall be in accordance with the recommendations of the following:

1) This outline proposal report
2) Statutory Undertakings Regulations.
3) Health & Safety Executive (HSE) Guidance.
4) CDM Regulations.
5) All relevant British Standards
6) BS 7671 - Electrical Wiring Regulations latest edition.
7) The Water Regulations.
8) HVCA Maintenance Guides.
9) Gas Safety Regulations
10) BS 5839 (Fire Alarm Systems)
11) Building Regulations
12) The requirements of Building Control (including Fire Officer)
13) Local Authority Rules and Regulations
14) The DDA (Disability Discrimination Act) requirements
15) Water Research Centre (WRC) – The Water Fittings and Materials Directory
16) HSC ACoP L8 - The Control of Legionellosis Bacteria In Water Systems
17) All current C.I.B.S.E. Guides and commissioning codes.

2.5 Temperature and Humidity Conditions

2.5.1 External Design Temperatures

Winter Conditions

The external design conditions for heat generating plant, has been based on a lightweight building. Therefore the 24 hour results from CIBSE Guide A, table 2.3 has been used. The external temperature selected has been based upon an associated risk that the temperature will be exceeded on one 24 hour period in a year.

Summer Conditions

The external temperature selected for the purpose of sizing cooling plant has been based on an exceedance risk of 1% or less during the summer months and has been selected from CIBSE Guide A, table 2.15.

Season	Conditions
Winter	–4°C, 100% saturated
Summer	30°C dry bulb, 21°C wet blub

No further allowance has been made for present or future climate change.

2.5.2 Internal Design Conditions

Internal design conditions are proposed as follows:

Room Type	Temperature °C Winter (Note 1)	Temperature °C Summer	Humidity (%RH)
Living Rooms	**22** ± 2°C	**21** ± 2°C	Note 3
Dining Rooms	**22** ± 2°C	**21** ± 2°C	Note 3
Bedrooms	**22** ± 2°C	**21** ± 3°C	Note 3
Dressing Rooms	**22** ± 2°C	No cooling	Note 2
Kitchens/	**22** ± 2°C	No cooling	Note 2
Playrooms/Snugs	**22** ± 2°C	No cooling	Note 2
Bathrooms/En-suites	**22** ± 2°C	No cooling	Note 2
WC's	**20** ± 2°C	No cooling	Note 2
Circulation spaces	**20** ± 2°C	No cooling	Uncontrolled
Circulation spaces – Basement	**20** ± 2°C	No cooling	Note 2
Plantrooms	Uncontrolled	No cooling	Uncontrolled
Utility	**21** ± 2°C	No cooling	Note 2
Gym	**20** ± 2°C	**20** ± 2°C	Note 2
Cinema	**22** ± 2°C	**21** ± 2°C	Note 2
Changing Rooms	**22** ± 2°C	No cooling	Note 2
Pool Hall	**30**°C db, **24**°C wb	**30**°C db, **24**°C wb	60%(Note 4)

Note 1: All temperatures as measured at the control sensor positions
Note 2: Mechanical ventilation used to reduce humidity levels
Note 3: No humidity control proposed other than the removal of moisture through condensation forming on fan coil unit cooling coils.
Note 4: Provisional temperatures assumed. To be confirmed by appointed pool specialist.

2.6 Ventilation Standards

There are two types of mechanical ventilation that can be utilised for the development, these are;

A whole house mechanical supply and extract ventilation with heat recovery to all areas.

Or

A combination of mechanical supply and extract ventilation with heat recovery in the basement level and extract ventilation only to bathrooms and WC's on the upper floors

Additional ventilation during warmer months and for purge ventilation will be provided by openable windows.

The ventilation rates below are to be reviewed as part of the detailed ventilation design.

Requirements for background ventilators are to be reviewed with the architect during the developed design stage extract only ventilation is selected.

Table below to be amended in line with project specific rooms:

Level	Room	Minimum ventilation rate (l/s)
Basement	Cinema	80 l/s (supply and extract)
Basement	WC's	6 l/s (extract)
Basement	Gym	40 l/s (supply and extract)
Basement	Store	6 l/s (extract)
Basement	Shower Room/Changing rooms	10 l/s (extract)
Basement	Hall	8 l/s (supply)
Basement	Pool Hall	TBC TBC
Basement	Utility room	15 l/s (extract)
Ground	WC	6 l/s (extract)
Ground	Dining Room	40 l/s (supply and extract)
Ground	Utility/Bike Store	15 l/s (extract)
Ground	Playroom / TV Snug	20 l/s (supply)
Ground	Kitchen	30 l/s (supply and extract)
Ground	Living Room	40 l/s (supply and extract)
Ground	Entrance hall	10 l/s (Supply)
First	Master Bedroom	20 l/s (supply)
First	Master En-suite	16 l/s (extract)
First	Master WC	6 l/s (extract)
First	Master Shower	8 l/s (extract)
First	Master Dressing Rooms	10 l/s (supply)
First	Bedrooms	14 l/s (supply)
First	En-suites	16 l/s (extract)
First	Laundry	15 l/s (extract)
Second	En-suite	16 l/s (extract)
Second	Dressing Rooms	6 l/s (supply)
Second	Play / Snug	20 l/s (supply and extract)
Second	Bedrooms	14 l/s (supply)

2.5 Infiltration

The following infiltration rates will be used in the calculation of heating loads (and cooling loads if applicable):

Zone	Criteria
Perimeter	1.0 (MVHR) or 1.5 (Extract Only) ACH^{-1} Winter 0.5 ACH^{-1} Summer
Internal	0.25 ACH^{-1}

2.6 Noise

2.6.1 External Noise Criteria

All mechanical plant will be selected and/or provided with acoustic treatment so as to meet with the external noise criteria as detailed by the Planning Conditions.

A background noise assessment has determined that any external plant must be located within a 2.2m high screened enclosure to meet the noise criteria as detailed by the Planning Conditions. External heat rejection condensers will be required to operate in low noise mode of 28dB for night-time operation (11pm - 7am) as instructed by the local authority. All plant must be installed at least 1m from any screened wall.

2.6.2 Internal Building Services Noise Criteria

The M&E systems shall be designed such that the levels of M&E noise ratings are not exceeded in the areas defined. This includes noise from M&E systems dedicated to each area, noise intrusion from M&E noise sources (i.e. noise from external plant via windows) and structure borne noise from M&E sources. The M&E systems will be designed such that the following levels of M&E noise are achieved in the areas defined:

Area	Maximum Noise Level
Bedrooms	NR25
Kitchens	NR45
Primary Living Spaces	NR30
Bathrooms/ En-suites/ WC's	NR35
Gym's	NR40
Plantrooms	NR60
Circulation Areas	NR40
Cinema	NR25

All plant spaces shall be controlled to allow acoustic criteria in the adjacent spaces to be achieved.

Attenuators will be specified to achieve the design criteria listed above. The following noise paths will be taken into consideration:

- Primary fan noise transmission through the ductwork distribution system to internal occupied areas.
- Primary fan noise breakout from attenuator casings and ductwork on the quiet side of attenuators, through the ceiling structure to occupied areas below.
- Fan noise transmission through the ductwork distribution system to external areas, via the intake and discharge openings.

Where attenuators are located in plantroom areas, the ductwork from the attenuator to the point at which the duct penetrates and exits the plantroom structure will be acoustically lagged.

Where mechanical equipment is located in or above areas with specified noise criteria, the level of noise radiated from the equipment casings will be controlled to an appropriate level through acoustic treatment to bulkheads, enclosures and joinery.

With consideration to acoustics, the following guide duct velocities (m/s) will be adhered to:

Description	NR 40	NR 35	NR 30	NR 25
Riser	9.0	7.5	6.0	5.0
Main Branch (Above Ceiling)	6.0	5.0	4.0	3.0
Grille	3.0	2.5	2.0	1.5
Diffuser	2.5	2.0	1.5	1.0
Stub Duct (Above Ceiling)	4.0	3.0	2.0	1.5

2.7 Domestic Water Services

All hot and cold water services will be designed in accordance with BS6700 and Part G of the Building Regulations.

Water flow rates will be based on the loading unit method described in appendix D1 of BS6700. This method applies diversity to the total flow rate to each appliance type. This will enable a maximum simultaneous demand flow rate to be calculated.

Proposed loading units are as follows:

Fitting	LU's
WC flushing cistern	2
Wash hand basins, dish washers and washing machines	3
Bath tap	22 (based on DN 25 outlet fitting)
Sinks	5 (based on DN 20 outlet fitting)
Showers	3 (based on DN 15 outlet fitting)

Hot water storage vessels shall incorporate precautions to prevent the temperature stored to not exceed 100°C at any time (minimum of two independent safety relief valves required).

A thermostatic mixing device shall be installed on all baths to limit the delivered water to 48°C.

Water shall be stored at 65°C and distributed at no less than 60°C.

Hot water storage volume shall be reviewed against the proposed sanitary ware specification during the developed design stage and the requirement

The incoming water supply will incorporate Water Regulations Fluid Category 3 back flow protection via a double check valve.

External hose union bib taps are to incorporate a double check valve where supplied direct from the mains.

Minimum cold water storage will be provided in accordance with BS EN 806-2-2005 guidance of 200 litres per bed space.

2.10 Lighting

Average illuminance levels shall be provided as follows:

Room	Lux Level	Notes
Bedrooms	50-100 lux	Supplemented by floor/table lamps
Primary Living Spaces	50-100 lux	Supplemented by floor/table lamps
Bathrooms/ En-suites	150 lux	
Gyms	300 lux	
Kitchen	150 lux	Supplemented by under cupboard lighting for worktops.
Circulation, Landings	100-150 lux	
Store Rooms / Back-of-House	100 lux	

It should be noted that the levels are a guide only as the lighting design will be undertaken by the architect/specialist lighting designer.

2.11 SAP U Values and Air Permeability

U values used for SAP calculations and thermal heat calculations were agreed with architect during this design stage:

- Basement External Walls - 0.15 W/m^{2}K
- External Walls – 0.15 W/m^{2}K
- Pitched Roof - 0.16 W/m^{2}K
- Flat Roof - 0.16 W/m^{2}K

- Basement Floor Slab – 0.15 W/m²K
- Ground Floor Slab - 0.15 W/m²K
- Windows – 1.50 W/m²K
- Roof Lights – 1.50 W/m²K
- Front Door – 1.80 W/m²K

The maximum air permeability will be as follows:

3.0 m³/(h.m²) @ 50 Pa

For further details of SAP calculations refer to Appendix A within the Energy Strategy Report.

2.12 Heat Gains

The following heat gains will be used in future cooling load calculations:

Heat Gain Type	Description
Lighting	Assumed to be off during daylight hours (except in basement, where 15 W/m² will be used)
Power	Negligible, except for plasma screens and other large items of electronic equipment. PC's - 55W TV Screens- 80W AV Equipment- 6kW
Occupancy	Gains as per CIBSE A 2006. Sensible Rate of Heat Emission- 70 W/person Latent Rate of Heat Emission- 45 W/person
Solar gain	As calculated.

2.13 Occupancy Levels

The following occupancy levels will be used for the purpose of thermal heat gain calculations and ventilation loads:

Room	Occupancy Level
Primary Living Spaces	Based on Furniture Layout
Bedrooms	2 Persons
Dressing Rooms	1 Person
Gym	4 Persons
Cinema	Based on Furniture Layout

2.14 Public Health

2.14.1 General

The design of the above ground foul drainage systems will be to meet the requirements of the following specifically and any other relevant codes of practice;

- BS EN 12056-2:2000 – Gravity drainage systems inside buildings – Part 2 Sanitary pipework, layout and calculation
- Building Regulations Approved Document Part H

2.14.2 Foul Water Drainage

The Foul Water above ground drainage system will be designed based on a Primary Ventilated system and Modified Primary Ventilated system as required. The system will be sized based upon the discharge unit method, using the following frequency factors (k): -

Residential Areas intermittent use 0.5 (k)

Appliances	System III DU (l/s)
Wash Basin & Bidet	0.3
Shower without a plug	0.4
Bath	1.3
Kitchen Sink	1.3
Dishwasher	0.2
Washing Machine 6kg	0.6
WC with 6ltr cistern	1.7

2.14.3 Rain Water Drainage

It is understood the rain water scheme will include external rain water pipes and associated hoppers and gutters designed and specified by the Architect. Cooper Homewood will provide assistance to the scheme by providing flowrate calculations for roof runoff and advising on system arrangement.

The rain water flowrate calculations will be designed based on the design criteria from BSEN 12056 pt 3.

The rain water system will be designed on a Category 2 system and a 1:50yr storm event equating to a rainfall intensity of 0.056l/s/m².

Ω End of Section

3.0 Sustainability and Building Regulations

3.1 Building Regulations Part L

The development is required to comply with Part L of the Building Regulations. The following approved document(s) will be used as the basis of compliance:

Approved Document L1A, 2013 – Conservation of Fuel and Power in New Dwellings

The table below shows the proposed energy efficient equipment to be considered:

Energy Efficient Proposals	Description
Low Energy Lighting	100% of the light fittings will be low energy to maximise energy efficiency and reduce the energy required for lighting.
Heating Controls	Enhanced zone heating controls, to comprise programmer, room thermostats, weather and or load compensation.
Whole House Ventilation	Ventilation in the form of balanced mechanical ventilation with heat recovery to provide an energy efficient ventilation system which will minimise the heating of incoming fresh air, thus reducing the energy consumption of the heating systems. The use of extract only on the upper floors is still to be confirmed at a later stages.
Enhanced Thermal Insulation	Thermal distribution networks and water storage tanks will be insulated beyond the requirements of the relevant standards to reduce energy losses, thus improve efficiency of the systems.

The current SAP calculations are based on the use of air source heat pumps (ASHP) and photovoltaic panels (PV's) provides an overall carbon reductions of 38.38% above Part L Building Regulation requirements.

For further details of SAP calculations refer to Appendix A.

3.2 Low/Zero Carbon Technologies

The energy strategy for the development identified the need to provide photovoltaic (PV) panels to generate electricity and Air Source Heat Pumps (ASHP) for the heating and hot water.

3.2.1 Photovoltaic Panels

The SAP assessment used a 327W panel (physical size of 1908x1094) installed horizontally and facing South with a total of 4No. panels are to be installed at roof level. The SAP calculations take into account the over shading from the roof structure. The inverter shall be installed within the plant room with the incoming main & main electrical distribution.

3.2.2 Air Source Heat Pump (ASHP)

It is proposed the property will be served by an Air Source Heat Pump system.

Heat from the external air is absorbed by an evaporator coil; the compressor pumps the refrigerant through the heat pump and compresses the gaseous refrigerant to the temperature needed for heat distribution. The heat exchanger transfers the heat from the refrigerant to air or water. In an air-to-water system the heat produced is used to heat water which can be used to pre-heat water in a storage tank or circulate through under floor heating or radiators.

Heat pumps produce hot water at a lower temperature (typically 35-45°C) than a standard boiler system, which makes under floor heating the most effective option.

The efficiency of air source systems is measured by a coefficient of performance (CoP). CoPs for air source systems are typically 2.5. This means that for every unit of electricity used to power the pump 2.5 units of heat are produced, making it an efficient way of heating a building. However unlike a boiler an air source heat pump is located externally and subject to extreme weather conditions which can greatly affect the performance and efficiency of the heat pump itself.

3No.Condensers will be located at the rear of the garden and screened for acoustic purposes.

3.3 Energy Performance Certificate

An as built EPC will be provided by Cooper Homewood at the completion stage of the project.

Ω End of Section

4.0 Metering Strategy

The house shall be provided with new Electricity, Gas and Water meters are as follows:

4.1 Electricity

An application has been made to UKPN for a new 200A TP&N supply. The cut out, CT chamber and meter is proposed to be located within the basement plant room as detailed in the initial M&E sketches.

4.2 Gas

An application has been made to Fulcrum for a new gas supply. A new U25 gas meter is required. Gas is proposed to serve 2No. Stand-by Boilers, 2No. fire places, outdoor BBQ and kitchen cooking appliances.

The meter is proposed to be located externally in a meter enclosure.

4.3 Water

An application has been made to Thames Water for a new water supply for the property. Water is to serve a potable storage tank/booster set, a selection of drinking outlets in 1No kitchen, 2No. utility room, laundry, dishwasher and pool filters. The meter will be located in the footpath.

Ω End of Section

5.0 Mechanical Engineering Systems

5.1 Heating

Heating will be provided via wet underfloor heating throughout.

Boosted heating will be available via the comfort heating/cooling system.

Air source heat pump (ASHP) units will provide LTHW throughout the house. The ASHP units will be located within an external enclosure at the rear of property. The units will be sized to meet 100% of the total space heating load and will also serve the domestic hot water storage calorifiers.

2No individual boilers will be provided for back up purposes only. Boilers will be sized based on the property space heating requirement and the domestic hot water demand.

The flues from each stand by boiler will be terminate in accordance with the Clean Air Act and Part J of the Building Regulations. Flues will be concentric so that no additional ventilation for combustion purposes is required at basement level. Exact path and location to be determine during the design process.

Electric heated towel rails will be provided in all the bathrooms and en-suites. The electrical towel rails shall be controlled via timers located discreetly in adjacent rooms.

Bathrooms, and En-suite will be heated by either an electric or the wet underfloor heating system to be confirmed at a later stage.

The LTHW system will consist of a constant volume primary circuit connecting to a low loss header located within the basement plantroom. The system will be a sealed system with a pressurisation unit. From the low loss header separate LTHW branches will have secondary circulation pumps which will be inverter driven.

The secondary circuits will be as follows:

Circuit 1: Constant temperature domestic hot water calorifier circuit (flow 65ºC, return 55ºC).

Circuit 2: Variable temperature underfloor heating circuit (flow 50ºC, return 40ºC)

Circuit 3: Constant temperature pool water heating circuit (flow 65ºC, return 55ºC)

All pumps will be in-line duty/standby with automatic rotation through the Building Management System.

Pressurisation of the heating system will be provided by a Mikrofill (or similar) automatic system filling device.

All pipework will be thermally insulated, and run in copper table X and will distribute through ceiling, service voids and floor trenches. All pipework will be copper and fully insulated except where exposed.

LTHW pipes will be selected generally at 200/250 Pa/m with a maximum upper limit of 350 Pa/m to avoid noise and high velocities.

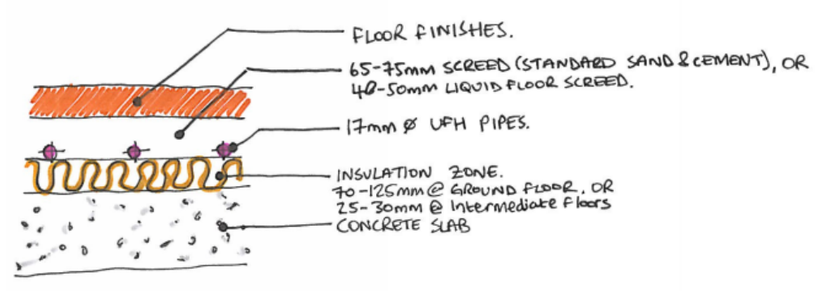
Wet underfloor heating systems will be installed within an insulated floor construction on all levels.

Where timber floors are proposed, floor sensors shall be used to limit floor temperatures to 27°C.

Underfloor heating manifolds will be located discretely within the house, concealed within a cupboard or joinery cabinet. The manifolds will require access for maintenance etc.

Typical floor build up for wet underfloor heating is illustrated below. From structural slab levels to top of screed, typical depths are 70mm to 135mm.

Room control shall be provided via AV central controller.



Typical Wet Underfloor Heating Build Up

5.2 Comfort Cooling

Comfort cooling is proposed within all bedrooms, living areas, basement primary rooms and AV plantroom. The cooling system shall be a 3-pipe system where heating and cooling will be provided simultaneously to different zones. The system will serve fan coil units in the various rooms. Fan coil units shall be concealed horizontal type either in ceiling voids over bathrooms, WCs, walk-in-wardrobes etc. or vertically mounted and concealed within architectural joinery.

Fan coil units shall be selected to meet the design heat gain or loss at medium fan speed. Minimum off-coil air temperatures shall be limited to 12°C.

Access for cleaning filters and on-going maintenance will be coordinated with the Architect and the Interior Designer. Should the unit suffer a major malfunction, which cannot be rectified via the maintenance access panel, will need to be replaced via destructive access.

Fan coil units shall be selected to meet the design heat gain or loss at medium fan speed.

Condensate from each FCU shall be extended in plastic pipework via gravity to drain via a dry in line trap.

Grilles and ductwork shall be sized at high fan speed setting. Diffusers arrangement and specifications are to be agreed with the interior designer and client.

Room control shall be provided locally integrated into the central control system.

A central master VRF controller shall be located on the front of the MCCP located in the plantroom.

5.3 Domestic Water Services

5.3.1 Cold Water

All sanitary appliances (including drinking water outlets) will be served by a boosted cold water circuit connected to a cold water storage tank located in the basement plantroom. Cold water storage will be provided with a direct metered mains cold water supply.

Direct mains connections shall be made to the Kitchens, utility rooms, laundry, all dishwasher and Pool Filters.

Cold water temperature shall not be greater than 2°C above the water temperature provided by the Water Supply Company/ Authority, without exceeding the maximum permitted cold water temperature of 20°C.

All pipework to be sleeved when passing through walls. Where pipework is required to run in the floor screed a dedicated metal trunking or a timber duct system with screwed plywood access cover will be specified.

A bypass on the boosted cold water circuit will be provided so that mains cold water can be used to serve the house, should the booster set fail.

Water shall be boosted to provide a minimum of 3 bar at each shower head. PRVs shall be set in the basement plant room and pipe work circuits to achieve this pressure.

The complete cold water system shall be installed using MDPE for buried pipework and copper Table 'X' pipework throughout the property.

A duty/standby/assist multi-stage inverter driven booster set shall boost water pressure to provide good water pressure to all levels of the property.

The incoming water main shall be treated via an electromagnetic water conditioner (Hydromag or similar and engineer approved).

The incoming water supply shall be provided with physical salt base water softening plant in a simplex arrangement to provide softened cold water to all bathrooms and softened hot water to all sanitary appliances.

Cold water shall be provided to 2No. bib taps for irrigation purposes. These shall be provided at the front and rear of the properties externally. All external taps shall be located within a lockable insulated cover. Location of all bib taps to be confirmed by the architect.

5.3.2 Hot Water

Hot water will be stored within calorifiers with an integral low temperature hot water (LTHW) coil. The cylinders will be located within the plantroom.

The calorifiers will be fitted with electric immersion heaters for raising the water temperature and back up purposes.

Pipework will be run in copper Table 'X' throughout.

Secondary hot water return circulation will be provided to ensure that the distributed water temperature does not drop below 55°C.

Thermostatic mixing valves shall be provided to each bath in accordance with Part G of the building regulations.

Discharges from safety, expansion, temperature relief valves from DHWS vessels will comply with DETR Guidance to the regulations (Byelaws) Clause G19.1 to 19.4 and, Building regulations G3 and discharge via an AUK3 air gap into a tundish.

All final connections shall include ballofix valves and incorporate flow restriction cartridges. Flow restrictors shall also be provided to comply with Part G of the Building Regulations.

Pressure reducing valves shall be used to reduce pressure in final pipework legs or individual sanitary appliances.

Hot water to be provided to bib taps to be confirmed by the client.

All water systems shall be sterilised and chlorinated in accordance with BS EN 806 parts 1-5 and BS 8558:2011.

5.4 Gas

A new gas main will be extended to the property. The gas main will extend to the basement plantroom to serve 2No. stand by boilers, external cooking area (location to be agreed), kitchens appliances and 2No gas fire places. Gas pipes will run in flexible Tracpipe.

5.5 Ventilation

The ventilation for the whole house will either be via mechanical ventilation heat recovery units or a combination of mechanical supply and extract ventilation with heat recovery in the basement level and extract ventilation only to bathrooms and WC's on the upper floors to be agreed at a later stage.

Extract air will be taken from bathrooms, en-suites and kitchens with fresh air being supplied into bedrooms and living spaces via supply air diffusers or supply air via openable windows.

The MVHR units will be located within plant space, wardrobe or store areas. Fresh air intake and exhaust air terminals will be located at roof level and on the façade. Distance between supply and exhaust terminals shall be coordinated with the Architect, with an aim to maintain a minimum of 3m of horizontal and vertical separation.

Where ducting passes through a fire-resisting wall/floor or fire compartment, the required measures to ensure compliance with Part B of the Building Regulations will be taken. Intumescent fire sleeves will be used on flat plastic ductwork and intumescent fire dampers will be used on galvanised steel ductwork. Input from the approved building control inspector will be required to establish if any duct runs will require fire lagging and/or automatic smoke control dampers linked to the fire alarm system

All MVHR units will be achieving the desired ventilation rates stated in section 2.6 and no less than minimum Part L Building regulation rates.

Diffusers and all visible equipment will be subject to Client/Architect comment and approval. Equipment will be selected to suit the interior design of the building with the aim of being as discrete as possible.

Condensate from each MVHR unit shall discharge into the nearest stack via a tundish and in-line dry trap.

The main kitchen extract will be provided by domestic type extract canopy, which is ducted direct to the façade. The hood will be provided by the specialist kitchen designer.

5.6 Automatic Controls

Control of individual room heating and cooling systems is still to be agreed with the client.

5.7 Sprinkler Systems

It is understood that sprinklers are not deemed a requirement for this project.

Ω End of Section

6.0 Electrical Engineering Systems

6.1 Incoming Services

The main property will be provided with a 200A TP&N electrical supply direct from the UK Power Networks (UKPN) infrastructure and terminate at the intake connecting to the main MCCB distribution board located within the basement plantroom via a CT metering chamber.

6.2 Telecommunications

New telecommunications lines will be provided from the BT Openreach. These shall consist of standard telephony and broadband lines as follows:

1. 2No. Analogue Telephone Lines
2. Broadband Line – Fastest available in the local network
3. Red Care Line for Security System

6.3 Low Voltage System

6.3.1 Sub-Mains LV Distribution

New single core cabling shall be installed from the meter location to the main electrical panel board within galvanised trunking. From the main panel board XLPE/SWA/PVC submain distribution cables shall serve major electrical equipment including final circuit distribution boards, a mechanical control panel (MCP), air source heat pumps and pool plant.

6.3.2 Main LV Panel Board

The main electrical panel board will be located within the basement plantroom. This will be an TP&N 250A MCCB Panel Board with incoming check meter sized accordingly.

The main electrical Distribution Board will provide dedicated power supplies to items such as the Air Source Heat Pump, the Fire Alarm Panel, Intruder Alarm Panel and Sub Mains to Distribution Boards.

6.3.3 Distribution Boards

All distribution boards shall be MCB/RCBO type with an incoming 125A rated isolator and sized to allow 25% spare electrical and physical capacity for future alterations.

Proposed distribution boards are as follows:

1. DB/POOL - Located in the Basement Plantroom to serve the Pool Plant
2. DB/B - Located in the Basement Plantroom to serve the Basement
3. DB/G - Located on the Ground Floor to serve the Ground Floor
4. DB/1 - Located on the First Floor to serve the First Floor and Second Floor

6.3.4 Wiring system

Final circuit power wiring will be flat twin and earth insulated cabling run surface clipped within ceiling voids and walls enclosed in galvanised steel capping behind dry lining to accessory locations.

Within exposed areas such as the plant rooms and storage areas, final circuit power wiring shall be single cables within galvanised metal trunking and conduits.

6.4 Generator

A standby generator is not understood to be a requirement for this project.

Space and infrastructure will be allowed for 2no Tesla batteries which can provide storage of 6.6kWh of electricity per unit providing a secondary source of power.

6.5 Small Power

6.5.1 Small Power Provision

General small power provision will be provided throughout the property, generally comprising of 13A switched socket outlets for general purpose use and convenience and 13A switched fused connection units for items of fixed equipment.

General power supplies shall be provided using the 32A final ring circuit principle or where load current demands provide 16/20/32/40A dedicated radial circuits.

Power supplies will be provided to the kitchen to suit the kitchen designer's equipment requirements. The Utility Room shall be provided with power to allow for a washing machine and a tumble drier.

Electric towel rails will be provided within bathrooms throughout the dwelling.

All socket outlets for general use are to be protected by RCBO's in accordance with the 17th Edition of the wiring regulations.

Floor boxes are not understood to be a requirement at this stage.

IP67 13A switched socket outlets will be provided to the front and rear gardens of the property.

6.5.2 Wiring and Accessory Finishes

The type of finishes and the mounting height for all electrical accessories will be determined in conjunction with the Client, Architect and Interior designer, mindful also of the requirements of the Building Regulations.

A recessed flush finish will be achieved in front of house areas. Surface mounted accessories will be provided to back of house areas.



Example of a Forbes & Lomax Invisible Twin 13A Socket



Example of a Focus SB Horizon SG Polished Chrome Twin 13A Socket



Example of a MK Edge Brushed Stainless Steel Single Gang Switch

6.6 Lighting

6.6.1 General Lighting

Internal lighting shall be provided in line with the specialist lighting designer's intent and architectural aspirations for the space.

All lighting will be in accordance with Part L 2013 of the Building regulations where applicable.

Separate low level 5A round pin socket outlets for lighting will be provided throughout.

All light switches shall match the finish of the other electrical accessories where possible.

Where downlighters are used, fire hoods will be provided to maintain fire barrier of ceiling (if required).

Lighting within plant areas shall be specified by Cooper Homewood. This will typically consist of surface mounted linear LED luminaires.

6.6.2 Emergency Lighting

Emergency lighting will be provided by means of self-contained, non-maintained emergency lighting luminaires within plant areas.

6.6.3 External Lighting

External lighting will be provided in line with the specialist lighting designer's intent and landscape architects aspirations for the grounds.

The external lighting will be controlled by the lighting control system.

6.6.4 Lighting Control and Blind/Curtain System.

A whole house scene setting lighting control system is proposed to be installed throughout the property with the exception of plantrooms. The lighting control panels shall be installed within back of house areas and plantrooms.

Pre-set scenes will be commissioned in the entertaining rooms and master bedroom as per the client's requirements. On/off/dimming will be provided to other front of house rooms. With the exception of plantrooms, the entire property will be connected to the lighting control system to allow a master all off switch.

The proposed control system will also control the blinds at ground floor level and the rear of the property at first floor level.

Keypads will be provided throughout the property. The final style, configuration and finish will need to be agreed with the client and will depend on what is to be controlled on a location by location basis.

The blind/curtain control system shall will be based on a system such as KNX or Lutron. To be discussed during the next stage.



Example of KNX Room Controller



Example of Typical Lutron Keypad

6.7 Fire Detection and Alarm System

A fire alarm and detection system shall be in accordance with BS 5839:2013 Part 6 and Part B of the Building Regulations shall be provided. The system will be based on a mixture of analogue addressable smoke and heat detectors.

The system shall be designed to a Grade A, category LD2 system, with detectors sited in accordance with the standards and recommendations of BS 5839-1 for a category L2 system.

The fire alarm and detection system shall be wired concealed throughout in insulated and sheathed cable.

Location of detectors, luminaries and other ceiling mounted equipment shall be co-ordinated to provide a harmonised layout arrangement.

Manual call points will not be provided.



Example of Smoke Detector with sounder base – Apollo Addressable



Example of Smoke Detector with sounder base – Hochiki Addressable

6.8 Audio-Visual Systems (AV)

The audio-visual system will provide for music and high definition visuals in the Pool, Gym, Study, Snug, Living Room, Kitchen, Master Bedroom and Loft Playroom.

The system will be capable of distributing central media, apple tv and Sky Q.

The AV system will allow control from Apple IOS Devices.

The cinema will not be connected to the AV system, it will be on a separate dedicated system.

6.9 TV and Radio Distribution

An Astra Satellite dish and UHF, VHF and DAB aerials will be installed at roof level of the property. The final location of this equipment is to be agreed with the architect and planning authority.

The UHF, VHF and DAB aerial and Satellite dish will be capable of delivering Terrestrial TV and Radio services including Freeview, Sky, Sky+ and Sky Q.

The decoders and distribution equipment for the provision of TV services will be located in a centralised location within the AV racks in AV/Plantroom.

6.10 Voice and Data Distribution

The telecoms and data system shall generally comprise of RJ45 outlets provided in all primary rooms and bedrooms, wired using Cat 6a data cables installed concealed from the AV distribution racks.

The incoming telephone lines shall terminate into a switch panel within the AV rack. The active equipment to form the telephone and data network shall be provided by the AV integrator.

A professional grade wireless network system shall be provided throughout all areas of the house and garden.

An IP telephony system shall be provided throughout the property.

6.12 Access Control

The following means will be provided to control access to the property

- Mechanical locks

6.12.1 Mechanical Locks

Mechanical locks will be used to secure the external doors and windows of the property. The specification and selection of this equipment shall be by the Architect.

6.12.2 Video Door Entry

A colour video door entry panel shall be provided at the main entrance door to the property to allow two way voice communication and video images of the caller to before access in granted. Internal handsets will be provided at the main front door, the basement lobby and the 1st floor lobby. The system will allow colour video and audio only, no electronic opening of the front door. The main entrance door and all other door will be opened manually and locked by key.



External Entry Panel (BPT) - Satin Black



Internal Handsets (BPT) - Opale Video Monitor



External Entry Panel (GIRA)





Internal Handsets (GIRA)

6.13 Surveillance (CCTV)

A video surveillance system shall be installed at the property to monitor the external perimeter. The system shall consist of discrete but visible fixed cameras mounted on the external facade of the building. The specification of each camera including low light performance, IR illumination, audio and other functions are to be discussed on a camera-by-camera basis during the detailed design stage with the Audio Visual Specialist.

The surveillance cameras will be IP based, and all video images will be recorded digitally and stored for 31 days before being overwritten automatically. The images shall be installed on a dedicated Network Video Recorder (NVR) which shall be interfaced with the AV and other security systems and shall have the capability of remote access via the internet.



Typical Bullet Weather-proof Camera



Typical Dome Camera

6.14 Intruder Alarm

An intruder alarm system, consisting of dual technology PIR sensors, doors contacts and panic alarm buttons shall be provided throughout the property.

The system shall be designed to comply with the requirements for police response and linked to a ‘Redcare’ type monitored telephone line.

The alarm sounders shall be installed at socket height utilising metal finish ‘socket type’ decorative sounders to match the electrical accessories.

A Panic alarm button shall be provided at the front door and beside each bed.

The system shall be supplied and installed by a member of British Security Industry Association and a Gold member of National Security Inspectorate. The system shall be design to BS EN 50131-1, Grade 3.

Keypads will be provided at all entrances on the ground floor and on each landing.



Honeywell Pet Tolerant PIR



Typical Intruder Alarm Keypad



Typical Flush Mounted Panic Alarm

6.15 Earthing and Bonding

A complete earthing and bonding system shall be provided in accordance with BS7671, BS7430: Code of Practice for earthing and all relevant standards and regulations. This shall include all electrical equipment, luminaires etc, in accordance with the requirements of BS 7671.

Earthing of all mechanical and electrical systems, extraneous and exposed metalwork shall be provided ensuring earth continuity is maintained throughout the installation.

Where cable armouring is utilised as circuit protective conductors, separate conductors, suitably sized shall be installed, between the earthing system and the earth termination bar within the equipment to which the cable is terminated.

Mains and supplementary bonding, in accordance with BS 7671, to the following services shall be provided:

- All mechanical services pipework and equipment.
- All incoming services.
- Metallic Ductwork.
- Drainage pipework.
- Structural steelwork members.
- All extraneous metallic components of the structure.
- Suspended ceiling structure.

6.16 Lightning Protection

The requirement for a lightning protection system shall be discussed during the next stage.

A surge protection device (SPD) shall be provided to the main panel board to protect against a power surge on the electrical system.

Ω End of Section

7.0 Public Health Services

7.1 General

The public health engineering systems will comprise foul drainage systems that will be completely separate and independent from the rainwater drainage systems and will utilise the minimum amount of pipework necessary to carry away the waste water discharges from roofs, sanitary appliances and other dedicated discharge points, quietly and with freedom from nuisance or risk of damage to health.

7.2 Above Ground Foul Water Drainage

A network of new above ground foul water drainage pipework will be provided to serve the various areas of this residential building including kitchens and bathrooms.

The above ground foul water drainage system will be based upon a Primary Ventilated System configuration as described in BSEN12056 pt2.

The new drainage system shall be designed and installed ensuring the following conditions are met:

- Appliances drain quickly, quietly and completely at all times without nuisance and risk to public health
- Discharge is conveyed without crossflow, backfall, leakage or blockage
- Air from drainage systems does not enter building
- The system can be adequately tested, cleaned and maintained

The proposed above ground Soil Vent Pipe (SVP) locations have been set out for this design stage but are still under review for the best design solution and to suit the interior arrangement.

The internal layout of the building is such that the bathrooms and other wet rooms do not stack up. As a result of this, there is a need to offset SVP's in ceiling voids as well as offsetting waste pipes from showers and baths. The offsets will provide a small risk to the overall performance of the above ground drainage system. Offsets create turbulent water, which in turn creates noise break out and negative/positive pressure fluctuations. Horizontal pipes also impact on ceiling void depths.

The offsets will be acoustically insulated to reduce noise breakout and will also require a separate anti siphon vent pipe. Coordination will be undertaken with the Architect for the best room arrangement to help the process of managing drainage pipe offsets. The longer the offset the deeper the ceiling void will need to be.

Access to SVP's will be via access doors or by destructive access through plasterboard depending on stack location. Access is required at various points on the drainage system to facilitate maintenance should the unlikely event of a blockage occur.

All sanitaryware appliances will be connected to SVP's via appropriate deep seal traps and waste pipe.
It is understood that the showers will be as per the Level Access type. The waste pipe will be routed through the ceiling void of the floor below to an SVP. The shower drain specified by the Architect should be minimum 50mm trap to comply with building regulations.

The drainage pipe material for the above ground foul water drainage pipe work will be in HDPE plastic .We propose the acoustic dB12 system as this product is recognised as the best acoustically performing system for internal drainage.



Terrain Acoustic dB12 HDPE Pipework

The Basement level is lower than the gravity drainage system and therefore will discharge to a Foul Water pump (sump). The pump will discharge foul waste water via a rising main and connect to the gravity drainage system, then discharge to sewer. This system will be designed by a specialist.

The above ground drainage system will be vented to atmosphere via the roof vent. Details of the final vent locations will be detailed with the Architect to suit both engineering and aesthetic requirements.

The swimming pool plant will be designed and specified by a pool specialist. It is typically expected that a drainage backwash facility for the swimming pool will be required. For this type of building we would expect a drainage discharge of 8l/s for 10mins, fortnightly.

7.3 Above Ground Rain Water Drainage

The external rain water scheme will be designed and specified by the Architect. CH will provide roof area calculation for flowrate run off.

7.4 Below Ground Drainage

The below ground drainage system will be designed and set out coordinating with building foundations and tree route zone. The system will be designed by a specialist.

Ω End of Section

8.0 External Services

8.1 Water

A cold water supply will be taken to the external irrigation system (to be designed by the Landscape Architect when appointed). The cold water feed will incorporate Category 3 back flow protection. Any break tanks required for enhanced back flow protection will be designed by the Landscape Architect.

External hose union bib taps shall be provided to the back and to the front of the property (locations to be determined).

8.2 Power

External power shall be provided by wall mounted external sockets located on the outside of the building incorporating RCD protection.

A power supply shall be provided for the irrigation system designed by others.

8.3 Gas

A gas supply shall be taken to the external cooking/barbeque area. Final location to be agreed.

8.4 Drainage

New foul and rain water drainage will be provided and routed from the site to the final outfall manhole located at the front of the property.

Ω End of Section

Appendix A – Energy Strategy

COOPERHOMEWOOD
ENGINEERING CONSULTANCY

55 Sheldon Avenue
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Energy Strategy Report

Document Reference: 5147/01/06/ESR Rev B

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Audit Sheet

Rev.	Description	Prepared and checked by	Reviewed by	Date
A	First Issue	SP	JC	27/01/2016
B	Stage 2 ODP Issue	SP	JC	29/02/2016

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Executive Summary

This Energy Strategy has been prepared to set out how the proposed residential development at 55 Sheldon Avenue, Highgate will respond to local planning policy on environmental sustainability and low Carbon developments.

The proposal includes ambitious sustainability targets to reduce the proposed property's environmental impact through design, during construction and sustainable operation. A feasibility study for incorporation of Low or Zero Carbon (LZC) technologies and on site renewables has been undertaken and has determined that the most suited technologies are high efficiency Air Source Heat Pumps (ASHP) for space and hot water heating and Photovoltaic (PV) panels for electricity generation.

This assessment has demonstrated that the reduction in carbon emission required by the London Bough of Haringey Strategic Policy (SP4) is achievable through the implementation of the following strategy:

- 'Be Lean' measures; enhanced passive design measures such as improved U values and air tightness.
- 'Be Clean' measures; including highly efficient engineering services such as whole house ventilation with heat recovery and low energy lighting.
- 'Be Green' measures; the incorporation of a complimentary renewable energy source ASHP and PV's.

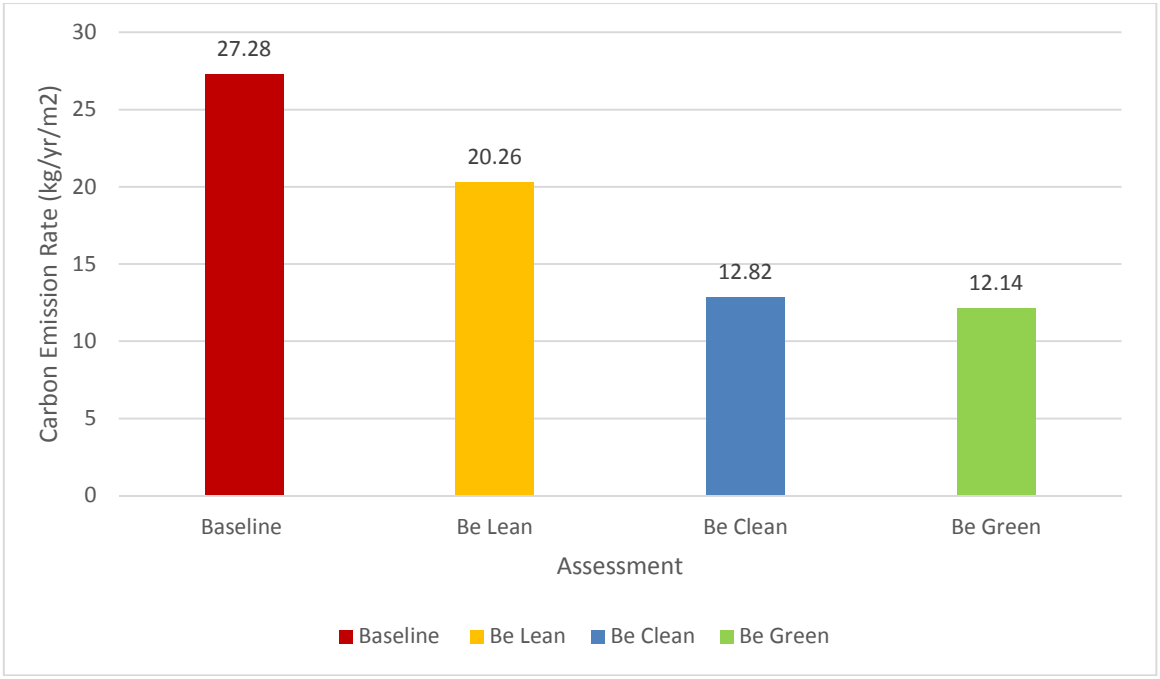


Figure 1: LZC Measure Carbon Reduction

Figure 1 illustrates a CO_2 reduction of more than 50% from the original Baseline building through the use of enhanced passive design measures and on-site renewable technologies. The proposed Be Green scheme will also reduce CO_2 emissions by 35% from minimum Building Regulation requirements. More than 20% of the predicted CO_2 emissions will be from on-site renewable energy regeneration. Therefore the proposed scheme will meet the London Borough of Haringey's planning policies relating to low carbon developments and the London Plan target for Carbon reductions from residential developments.

1.0 Introduction

Cooper Homewood (CH) have been appointed by Mr Jeff Tannenbaum to undertake the design of the Mechanical, Electrical and Public Health Engineering Services with an overseeing role during the site works to ensure the installation proceeds in line with the design intent. It is CH's responsibility to develop the energy strategy for the development and implement the use of low/zero carbon (LZC) technologies in line with the London Borough of Haringey Supplementary planning guidance SPD4.

This report has been prepared to document the data used to inform the Part L1A 2013 assessment for the new residential development at 55 Sheldon Avenue, Highgate.

The preliminary Part L assessment informs the main part of the energy strategy and determines the extent of the CO_2 emissions reductions for the development. The assessments have been carried out using Elmhurst Energy Design SAP software 2012 to demonstrate the suitability of the proposed passive design measures and to determine the requirement for renewable technologies.

The report addresses 'The London Plan' and the Mayors commitment to tackling climate change through policies and programmes to reduce London's carbon dioxide emissions in relation to the built environment. The plan address the requirement to design reduction methods at early design stages to reduce the need for 'bolt-on' technologies making buildings fit for purpose into the future without the need for adaptive measures and producing long term savings.

Minimising carbon dioxide emissions will be evaluated using the following energy hierarchy;

1. Be Lean; use less energy.
2. Be Clean; supply energy efficiently.
3. Be Green; use renewable energy.

This document has been completed using the Sustainable Design and Construction – Supplementary Planning Guidance document issued on April 2014 as part of the London Plan 2011 Implementation framework.

The Haringey sustainability checklist has been completed and provided in the appendices of this report.

Ω End of Section

2.0 Planning Agreement

The London Borough of Haringey planning agreement dated 6th October 2014 identifies the requirements for demonstrating that the developments carbon emissions will target a minimum 25% reduction from the minimum Building regulations requirement using a combination of complimentary low and zero carbon technologies

"In line with London Plan policy, the Council will promote and require all new developments to take measures to reduce energy use and carbon emissions during design, construction and occupation by incorporating the following measures:

- *From 2011 onwards, all new residential development will achieve a minimum 25% reduction in total regulated CO2 emissions in line with Code for Sustainable Homes Level 4 energy standards. All new residential development shall be zero carbon from 2016 onwards.*
- *All new development will be required, where viable, to achieve a reduction in predicted carbon dioxide emissions of 20% from on-site renewable energy regeneration, which can include connections to local sources of decentralised renewable energy.'*

The building has been modelled using SAP software to ascertain the minimum Building Regulations requirements and the extent of CO2 reductions from various low/zero carbon technologies (LZC). The building has been assessed against 2013 Building Regulations – 2012 SAP.

Minimum Standards for Code for Sustainable Homes (CfSH's) Energy targets are identified as follows:

Minimum standards

Code Level	Category	Minimum Standard
	Energy/CO_2	
1(★)	Percentage improvement over	10%
2(★★)	Target Emission Rate (TER)	18%
3(★★★)	as determined by the	25% Now minimum 2013 Building Regulations
4(★★★★)	2006 Building Regulation	44%
5(★★★★★)	Standards	100%
6(★★★★★★)		A 'zero carbon home' (heating, lighting, hot water and **all** other energy uses in the home)

Figure 2: Minimum Standards for Sustainable Code for Homes

The London Plan sets out the following targets for reducing carbon emissions for residential buildings;

Year	Improvement on 2010 Building Regulations
2010-2013	25%
2013-2016	40%
2016-2031	Zero carbon

"The Mayor will work with boroughs and developers to ensure that major developments meet the following targets for carbon dioxide emissions reduction in buildings. These targets are expressed as minimum improvements over the Target Emission Rate (TER) outlined in the national Building Regulations leading to zero carbon residential buildings from 2016 and zero carbon non-domestic buildings from 2019."

3.0 Baseline Building

This section details the information used to establish the properties carbon emissions using the minimum passive design measures defined by Building Regulations 2013 whilst using traditional services provisions. The purpose of this exercise is to establish the 'Baseline' carbon emissions for the development to enable the new passive and LZC technologies to be assessed.

This section details the measures required to meet carbon reduction requirements which comply with 'Limiting U Values' from Building Regulations Part L1a 2013.

3.1 Baseline Fabric Details

The following construction details have been applied in CH's preliminary 'Baseline Assessment' SAP calculation in order to try and achieve a Target Fabric Energy Efficiency (TFEE) of 63.70 kWh/m²/yr.

Passive Item	Values
External Wall U-Value	0.25 W/m^{2}K
Basement Wall U-Value	0.25 W/m^{2}K
Sloped Roof U-Value	0.2 W/m^{2}K
Flat Roof U-Value	0.2 W/m^{2}K
Basement Floor U-Value	0.25 W/m^{2}K
Front Door U-Value	2.0 W/m^{2}K
Windows U-Value	2.0 W/m^{2}K
Roof Light U-Value	2.0 W/m^{2}K
Glazing Type	Doubled glazed Low-E Soft 0.05
Thermal Bridging (Y Value)	0.15 (SAP Default)
Air Permeability	10 m^3/h.m^2 at 50 Pa

The baseline building has been modelled using the following criteria;

- Minimum Building Regulations U values and air permeability.
- Gas boiler efficiency 88%.
- Heating controls with Programmer, Room Stats and TRV's.
- Stored Hot water with 35mm factory applied foam.
- Cylinder temperature controlled by thermostat.
- 75% low energy lighting.
- No renewable technologies.

3.2 Baseline Carbon Emissions

Based upon the above data the existing carbon emissions for the development is as follows;

Overall: 27.28 Tonnes/yr

The baseline model fails the standard levels set out in Building Regulations and does not achieve CfSH's energy targets.

Full calculations for the base case development are provided in the appendices of this report. A summary of anticipated energy usage and carbon emissions is as follows:

Services	Building Energy Demand (kWh/yr)	CO_2 Emissions ($kgCO_2/yr$)	Building CO_2 Emissions (tonnes/yr)
Heating:	97337	21025	21.03
Hot Water:	4268	922	0.92
Auxiliary	8427	4374	4.37
Lighting:	1842	956	0.96
Cooling	0	0	0
Elec Generation	0	0	0
Total Heat & Hot water	101604	21947	21.95
Total Electricity	10269	5330	5.33
Total Regulated:	**111873**	**27277**	**27.28**

4.0 Proposed Passive Design Measures (Be Lean)

The strategic approach to any energy strategy should be to reduce the demand for energy in the first instance, prior to the consideration of integrating LZC energy sources, since controlling demand is the most effective way of reducing energy consumption and carbon dioxide emissions.

CH propose to use high efficiency engineering systems within the development to minimise energy consumption. This includes the following:

- Heat recovery within balanced mechanical ventilation systems.
- Energy efficient lighting.
- Class A rated fridges/freezers, Class A rated washing machines and dishwashers and Class B rated dryers will be considered (where provided).
- Ventilation control in bathrooms and kitchens to reduce fan energy, where appropriate.
- Variable speed drives for circulation pump.
- Variable speed drives for ventilation fans
- High efficiency motors incorporated into all building services
- High efficiency air source heat pumps to provide comfort cooling

In addition to the above, the following points outline the approaches and strategies that should be considered by the team as the design of the property progresses:

- Low U-values for external walls, glazing, roof and floors.
- High standards of airtightness (i.e. minimising air leakage and infiltration rates through gaps and openings).

The following improved passive design measures are as per the stated measures 'Be Lean' measures:

Passive Item	Values
External Wall U Value	0.15 W/m^{2}K
Basement wall U Value	0.15 W/m^{2}K
Roof U Value	0.16 W/m^{2}K
Basement Floor U-Value	0.15 W/m^{2}K
Windows U value	1.5 W/m^{2}K
External Doors	1.8W/m^{2}K
Thermal Bridging (Y Value)	0.103
Air Permeability	3m³/m²/hr@50Pa

4.1 Be Lean Carbon Emission Reductions

By the use of these measures the Dwelling Carbon Dioxide Emission Rate (DER) is 20.26kgCO^2/yr/m², which is 55.89% greater than the Target Emission Rate (TER) and therefore does not comply.

Figure 3 below illustrates the Baseline CO_2 emissions for the development and compares this against the base model scheme which incorporates improved passive design measures. It can be seen that through using passive design measures the building is not achieving building regulations Part L1A 2013.

Services	Building Energy Demand (kWh/yr)	CO_2 Emissions (kgCO_2/yr)	Building CO_2 Emissions (tonnes/yr)
Heating:	64703	13976	13.98
Hot Water:	4275	923	0.92
Auxiliary	8427	4374	4.38

Lighting:	1842	956	0.96
Cooling	0	0	0
Elec Generation	0	0	0
Total Heat & Hot water	68978	14899	14.90
Total Electricity	10269	5330	5.33
Total Regulated:	**79247**	**20229**	**20.23**
% Improvement over Baseline Assessment	**29.16**	**25.84**	**25.84**

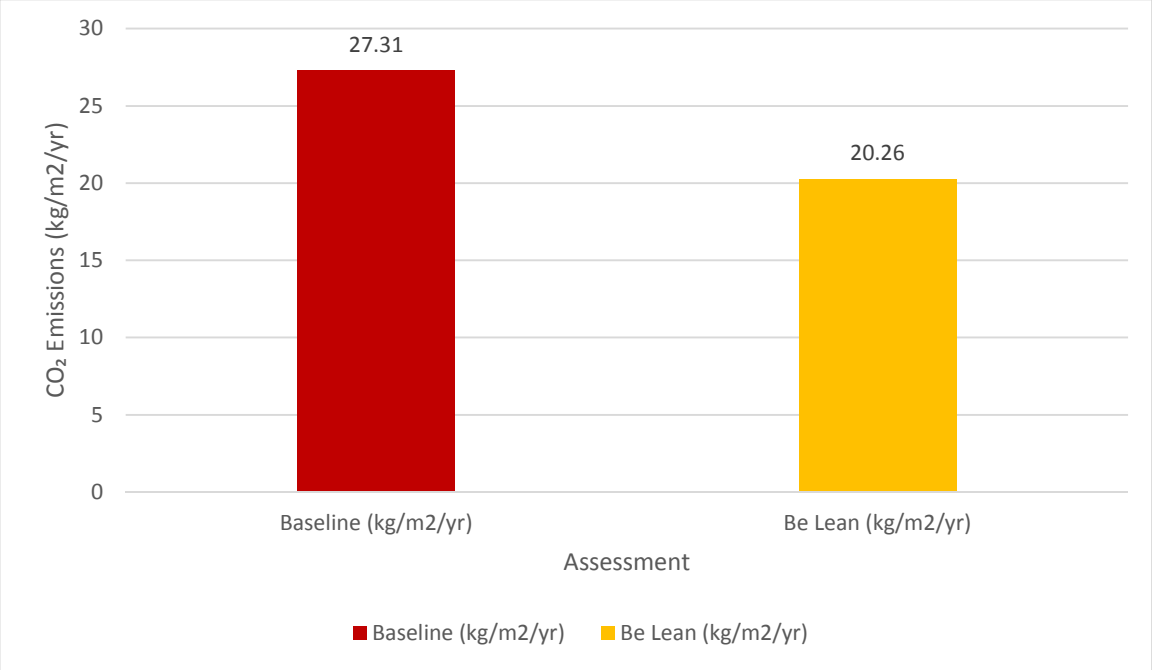


Figure 3: Be Lean Carbon Emission Reduction

5.0 Proposed Energy Efficient Measures (Be Clean)

The London Plan calls for the feasible use of energy efficient services with the use clean energy in new dwellings where feasible as listed in policies 5.5 and 5.6 as defined below;

Developers should assess the potential for their development to:

- Connect to an existing district heating or cooling network;
- Expand an existing district heating or cooling network, and connect to it; or
- Establish a site wide network, and enable the connection of existing buildings in the vicinity of the development.

The 'Be Clean' building has been modelled using the following criteria;

Items	Values	Notes
Condensing Boilers Efficiency	94%	Efficiency based upon MHS Thision Range
Hot Water Cylinder Insulation	80mm Factory Fitted Foam	
Ventilation Specific Fan Power	0.79	Based Upon Nuaire MRXBOX95AB-WH2 Range
Ventilation Heat Recovery Efficiency	87%	
% Low Energy Light Fittings	100	

5.1 Clean Technologies

5.1.1 District Energy

District energy systems produce hot or cold water at a central plant which can be distributed to multiple properties including residential buildings through pipework which is metered by the user. The energy systems include large scale combined heat and power, geothermal energy, conventional boilers, condenser farms and chilled water.

There is no district heating or cooling available within Sheldon Avenue or Hampstead. CH are not aware of any proposals to provide such a network in the future.

5.1.2 Combined Heat and Power (CHP)

Combined heat and power system (CHP) is a system where there is simultaneous generation of heat and power. The CHP unit is an engine that generates electricity with the production of heat as a bi-product. It is not considered a clean renewable source of energy unless a biomass boiler is used as the engine.

CHP requires a constant heating and electrical demand to maximise its benefits. A residential property such as 55 Sheldon Avenue does not provide a suitable constant load to make it a viable option for consideration.

5.2 Proposed Services Details

Due to the feasibility of CHP and District energy it is not proposed to use clean technologies at 55 Sheldon Avenue to achieve the planning requirements.

The property shall be fitted with energy efficient services as defined in the table above.

5.3 Be Clean Carbon Emission Reductions

By the use of these measures the Dwelling Carbon Dioxide Emission Rate (DER) is 12.82kgCO^2/yr/m², which is 2.36% less than the TER and therefore does not comply with the Planning requirement of achieving 25% reduction in carbon emissions.

Figure 4 illustrates the Baseline CO_2 emissions for the development and compares this against the 'Be Lean' scheme which incorporates energy efficient services. It can be seen that through using microgeneration the building can achieve building regulations Part L1A 2013 by 1.36% and meets code level 3 energy targets.

Services	Existing Building Energy Demand (kWh/yr)	Existing CO_2 Emissions ($kgCO_2$/yr)	Existing Building CO_2 Emissions (tonnes/yr)
Heating:	42196	9114	9.11
Hot Water:	3429	741	0.74
Auxiliary	4199	2179	2.18
Lighting:	1475	765	0.77
Cooling	0	0	0
Elec Generation	0	0	0
Total Heat & Hot water	45625	9855	9.86
Total Electricity	5674	2944	2.94
Total Regulated:	**51299**	**12799**	**12.80**
% Improvement over Baseline Assessment	**54.15**	**53.08**	**53.08**

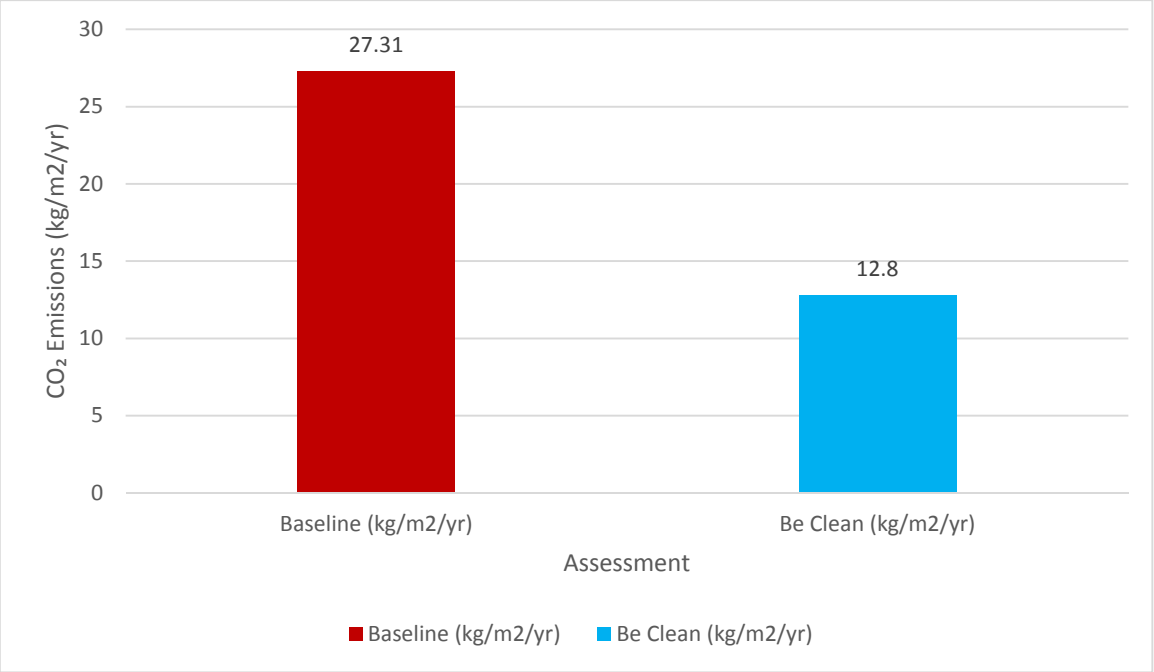


Figure 4: Be Clean Carbon Emission Reduction

6.0 Proposed Renewable Technologies (Be Green)

6.1 Green Technologies

The London Plan calls for the feasible use of renewable energy in new dwellings as listed in policies 5.4 and 5.7 as defined below;

- Boroughs and neighbourhoods should identify opportunities for the installation of renewable energy technologies in their boroughs and neighbourhoods.

Haringey Borough Council's aims to limited climate change by reducing CO2 emissions. Policy SP4 states that all new residential developments where viable to achieve a reduction in predicated carbon dioxide emissions of 20% from on-site renewable energy regeneration.

6.1.1 Photovoltaics

Photovoltaics is the method of converting solar energy into direct current electricity using semiconducting materials that exhibit the photovoltaic effect. This system is a clean production of generating electricity which can be built into the fabric of the building or installed on roofs facing south east at an angle of 30°. Used with a DC to AC inverter the system can generate up to 1.3kWp per panel.

Feed in tariffs can be reviewed at the time of install for money back from the local utility provider if energy generated isn't consumed by equipment within the dwelling.

It is proposed to implement PV's at 55 Sheldon Avenue for the following reasons;

- Fit and forget installation.
- Reasonable capital cost and the £/C02 saved rate is better than most renewable technologies.
- The feasibility of serving the electricity in the batteries is currently being investigated which ensures the property benefits from all of the energy generated.
- The property has a flat roof which lends itself to a PV installation, which is discretely positioned away from line of site (as much as possible).

The reduction in CO2 for implementing a PV array at 55 Sheldon Avenue is 2.8% complying with building regulations 2013 and meeting CfSH Level 3 energy levels.

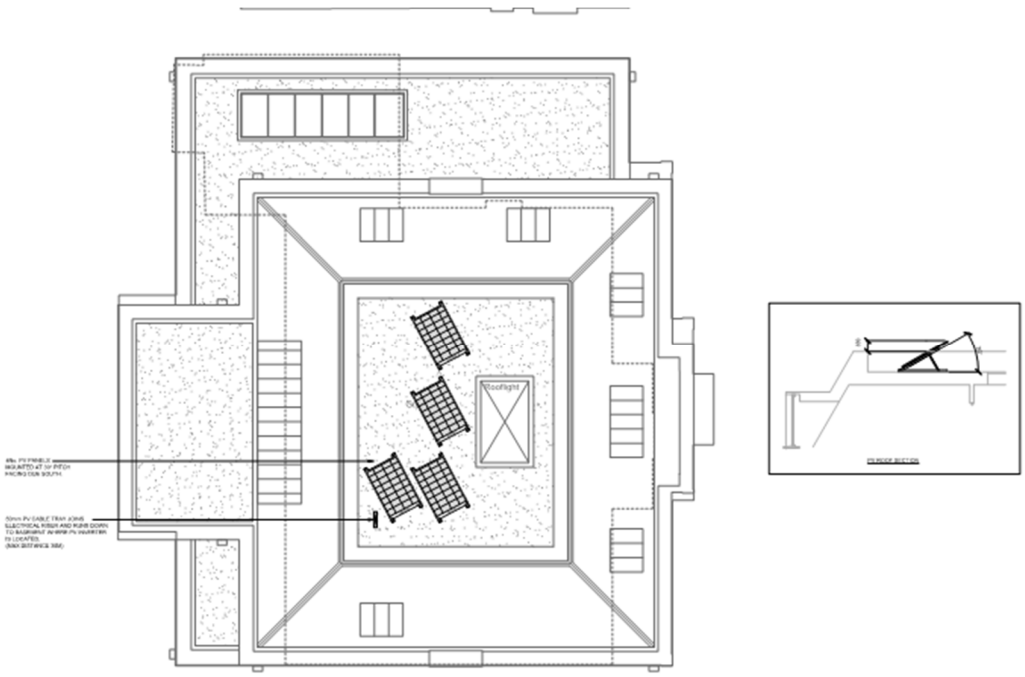


Fig 5. PV roof plan

6.1.2 Ground Source Heat Pumps

Ground source heat pumps are used to extract heat from the ground and raising it to the required operating temperature for heating and hot water within the property. The refrigeration process is used to circulate fluid through pipes buried in the ground and pass through a heat exchanger in the pump that extracts heat from the fluid. The pipe system can be installed vertically or horizontally away from tree routes and coordinated with building piles.

By the use of these measures the Dwelling Carbon Dioxide Emission Rate (DER) is 12.04 kgCO^2/yr/m², which is **49.04%** better than the figure set by Building Regulation requirements and therefor complies with LBH's SP4 strategy.

Although GSHP offers the best efficiencies of all heating systems and the highest level of C02 emissions reductions it is not being proposed to be taken from consideration due to the following reasons;

- High capital cost estimated at £150,000.
- The property benefits from a number of trees in the garden. GSHP has to be spread appropriately which means only a small number of the required boreholes can be located in the garden due to root protection zones associated with the trees.
- Further boreholes will be required within the footprint of the property, which leads to maintenance as the heads of the boreholes will be covered in concrete at completion and future maintenance will be impossible. The borehole layout is shown in figure 5 below.
- The Client is likely to be replacing components of the system within 15 years, which means payback of the original capital investment is very unlikely.

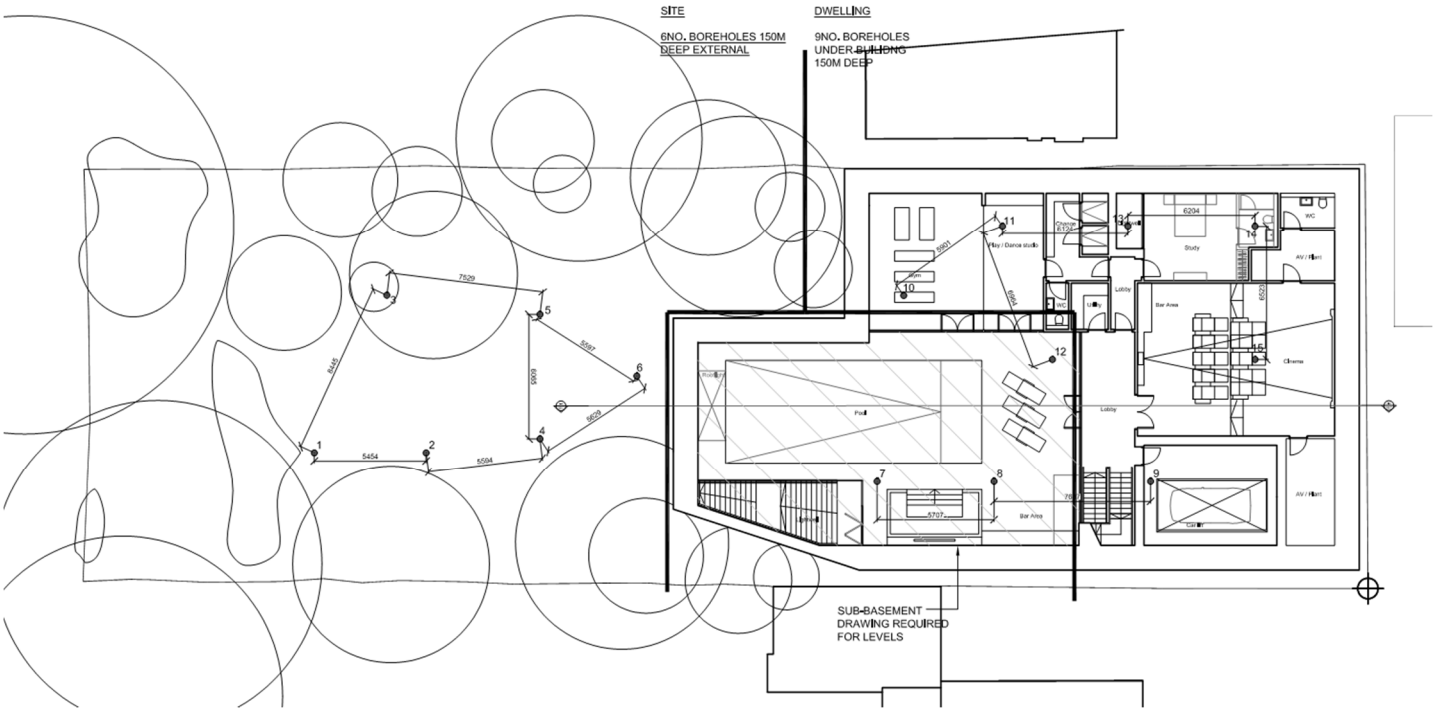


Fig 6. Proposed borehole layout

For the reasons above it is not proposed to take GSHP forward for further consideration.

6.1.3 Air Source Heat Pumps

Heat from the external air is absorbed by an evaporator coil; the compressor pumps the refrigerant through the heat pump and compresses the gaseous refrigerant to the temperature needed for heat distribution. The heat exchanger transfers the heat from the refrigerant to air or water. In an air-to-water system the heat produced is used to heat water which can be used to pre-heat water in a storage tank or circulate through under floor heating or radiators.

Heat pumps produce hot water at a lower temperature (typically 35-45°C) than a standard boiler system, which makes under floor heating the most effective option. In air-to-air systems this heat is used to produce warm air, which is circulated by fans to heat a building. The efficiency of air source systems is measured by a coefficient of performance (CoP). CoPs for air source systems are typically 2.5. This means that for every unit of electricity used to power the pump 2.5 units of heat are produced, making it an efficient way of heating a building. However unlike a boiler an air source heat pump is located externally and subject to extreme weather conditions which can greatly affect the performance and efficiency of the heat pump itself.

Condensers are located externally within an acoustic treated compound connected to internal located plant.

By the use of these measures the Dwelling Carbon Dioxide Emission Rate (DER) is 12.14 $kgCO^2/yr/m^2$, which is **38.38%** better than the minimum by Building Regulation targets.

Figure 7 shows the reduction in carbon emissions through 'Be green' measures with further improvement with the inclusion of 6.5m^2 PV panels alongside the ASHP system. It can be seen through the use of these LZC the total carbon emission rate is reduced by 15.14 Tonnes/yr from the Baseline development.

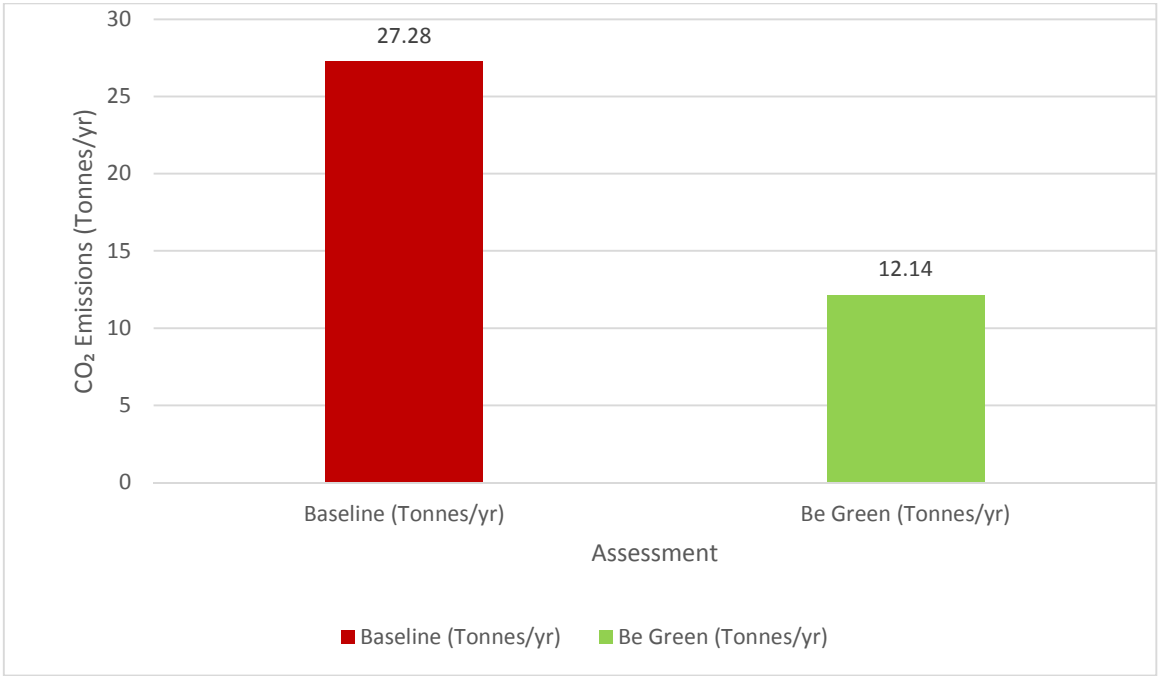


Figure 7: LZC Measure Carbon Reduction

Services	Existing Building Energy Demand (kWh/yr)	Existing CO_2 Emissions ($kgCO_2$/yr)	Existing Building CO_2 Emissions (tonnes/yr)
Heating:	16929	8786	8.8
Hot Water:	1782	925	0.93
Auxiliary	4102	2129	2.13
Lighting:	1473	765	7.7
Cooling	64	33.3	0.03
Elec Generation	-951	-494	-0.5
Total Heat & Hot water	18711	9711	9.71
Total Electricity	4624	2400	2.4
Total Regulated	23399	12144	12.14
% Improvement over Baseline Assessment	**79.08**	**55.49**	**55.49**

It is proposed to implement ASHP into the proposed heating system for the following reasons;

- ASHP efficiencies is in the region of 250% compared to traditional gas fired boiler system at circa 90%.
- It offers good carbon reductions and enables the property to exceed the code for sustainable homes energy target for Code Level 4.
- More than 20% of the carbon reductions will be from onsite renewable technologies which is a requirement of the Haringey SPD.
- The condensers associated with the ASHP system will be located in the garden screened and regulated level of acoustic treatment provided to meet the planning requirements for background noise limits. Figure 8 shows the indicative location for the condenser plant.
- The system will be specified and installed in line with Microgeneration Certification Scheme (MCS) which offers the benefit of the Renewable Heat Incentive (RHI) for the Client.

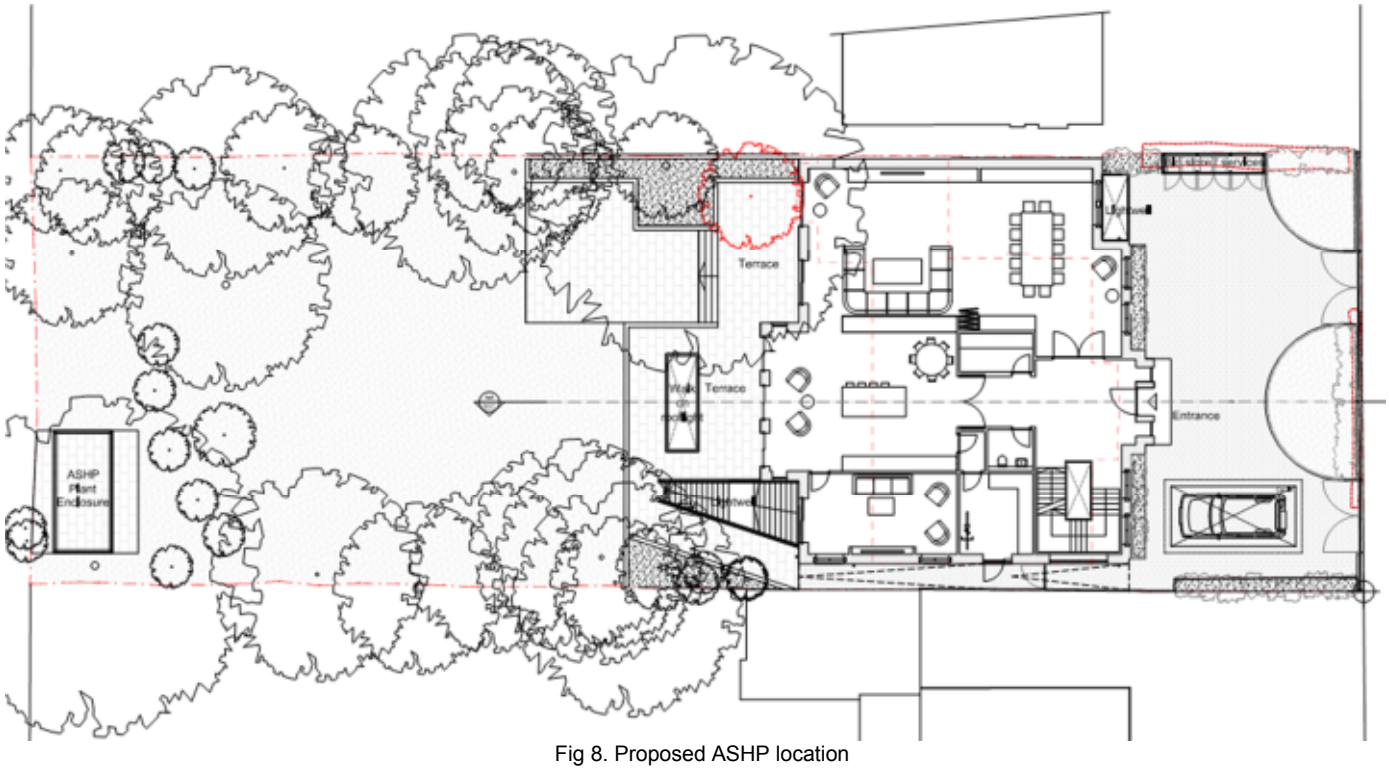


Fig 8. Proposed ASHP location

6.2 Feasibility of other Renewable Technologies

This section identifies the other renewable technologies that were considered for the 55 Sheldon Avenue project. Consideration has been given to the potential CO_2 emissions, air quality implications, maintenance and operational constraints and suitability of the technology in an urban residential conservation area.

6.2.1 Wind Turbines

Wind turbines use the wind's forces to turn a rotor which in turn generates electricity.

Wind power can be used for individual properties through the use of individual turbines or building integrated turbines.

The advantage is that this system offsets electricity demands from the mains system. The disadvantages are that the urban Conservation area setting means that wind turbines would unlikely be acceptable, would have to be of a small-scale (1-5kWe), which results in minimal CO2 emissions reductions compared to other technologies and would generate unwanted noise generation from the rotors. This system is therefore not recommended for the property at 55 Sheldon Avenue.

6.2.2 Biomass

Biomass heating involves the burning of a biofuel rather than a fossil fuel (typically gas or oil) in a boiler. Like oil, fuel must be delivered to site and stored in sufficient quantity to meet demand for a reasonable period.

For any biomass application the biofuel supply in the local area has to be investigated, both in terms of the raw biomass resource, the wood is normally seen as a by-product of other industries, or potential capacity to produce a usable fuel on site. The main biofuel for heating is wood chip and pellets, as with fossil fuels, the boiler must be designed to suit the fuel to be used. Biomass in the form of wood chips and pellets is often considered a carbon neutral fuel, as the carbon dioxide emitted during burning has been absorbed from the atmosphere by photosynthesis and no fossil fuel is involved. However biomass is assigned a carbon emission factor to account for the carbon emissions associated with transport and processing. Fully automated biomass boiler technology is well developed and established.

A biomass boiler system typically includes a fully automated auger fed boiler plant, fuel hopper and buffer vessel to balance the load on the boiler and help meet peak demands. Biomass boilers do require more frequent cleaning than gas boilers and they must be capable of being taken out of service for cooling and cleaning while maintaining the building heating supply. A strategy for the transportation of fuel to the site and a means for ash disposal are also required for biomass heating.

The advantages of such a system is that there are no aesthetic issues and unwanted noise can be contained within the plantroom and the system can provide substantial reductions in carbon dioxide emissions. It is also eligible for inclusion in the RHI scheme

However the disadvantages are that it requires increased space requirement for the biomass boiler and fuel store, fuel delivery and consumption requires regular management, separate flues are required for the biomass and gas fired boilers, flue height may need to be increased to safely disperse additional pollutants and increased requirement for ventilation in the basement plantroom.

It is not an ideal installation for a city location and therefore this system is not recommended for the property at 55 Sheldon Avenue.

6.2.2 Solar Hot Water

Active solar heating systems convert solar radiation into heat which can be used directly to generate low grade heat. Due to the UK climate active solar heating is best suited to low temperature heating applications which do not require direct sunlight, with the majority of installations being domestic. Due to the generation of low grade heat, via the solar system, the central hot water cylinder also has to be connected to the central boiler plant to raise the temperature of the stored water to 60°C to combat the risk of legionella. The efficiency of a solar collector panel depends upon a number of factors including the type of collector, the spectral response of the absorbing surface, panel insulation and the temperature difference between the panel and the ambient air.

There are two types of collectors used for solar water heating applications; flat plate collectors and evacuated tube collectors. In general evacuated tubes maintain their efficiency over a wide range of ambient temperatures and heating requirements. In constantly sunny climates flat plate collectors are more efficient whereas in more cloudy conditions their energy output drops off rapidly in comparison with evacuated tubes.

The collector position to give optimum all year round energy collection is south facing and at a tilt of 35 degrees to the horizontal however the orientation and tilt angle will usually be determined by the roof angle. Collectors can face anywhere between south, south east and south west and have tilt angles between 15 and 50° without losing more than 5% of optimum annual energy collection. Shading from trees, buildings etc. can produce significant losses in system efficiency and should be avoided

The main advantage is that this system is eligible for inclusion under the RHI, it can also provide an additional source of heating for the swimming pool (particularly in summer months) with almost silent operation so no potential noise issues.

There is limited roof space available for solar panels and as aforementioned it is proposed to locate PV panels on the roof. PV panels combined with ASHP offer greater levels of CO2 emission reductions, therefore it is not recommended to use this technologies at 55 Sheldon Avenue.

7.0 Other Services

7.1 Controls Design

During the technical design the following measures shall be added to control and monitor the systems proposed in the Be Green strategy.

- Heating Controls
- Ventilation Controls
- Building Management System
- Cabling and Containment
- Testing and Commissioning of System

The system for controlling the building services shall be designed and specified to include a control philosophy. The system shall include the following as a minimum to ensure the occupier is able to monitor the equipment and reduce their energy use.

- Room Controls (Sensors, Heating and Cooling Controllers etc.)
- Headend Control equipment.
- Plant Controls
- Interface Equipment
- Cabling and Containment

The installation shall be fully tested and commissioned by the Controls Specialist Installer.

7.2 Transport

The site is within walking distance from a number of bus services.

Cycle storage will be provided for the residents within a secure location.

7.3 Noise Pollution

A background noise survey will be provided for the development and will be identify the level of acoustic treatment required to meet local authorities noise limits for M&E plant.

Ω End of Section

8.0 Conclusion

This assessment has demonstrated that the 25% reduction in carbon emissions as requested by The London Borough of Haringey is achievable through the implementation of the following strategy:

- Be Lean' measures; enhanced passive design measures such as improved U values and air tightness.
- 'Be Clean' measures; including highly efficient engineering services such as gas condensing boilers, whole house ventilation with heat recovery and low energy lighting
- 'Be Green' measures; the incorporation of a complimentary renewable energy source via roof mounted photovoltaic panels and air source heat pumps.

Implementing the design of ASHP and Solar PV's within 55 Sheldon Avenue with passive design measures provides a Dwelling Carbon Dioxide Emission Rate (DER) or 12.16 kgCO^2/yr/m^2 giving a reduction of 38.28% over minimum building regulation requirements.

With the use of green technologies Haringey's target of 20% reduction through on-site renewable energy has been achieved.

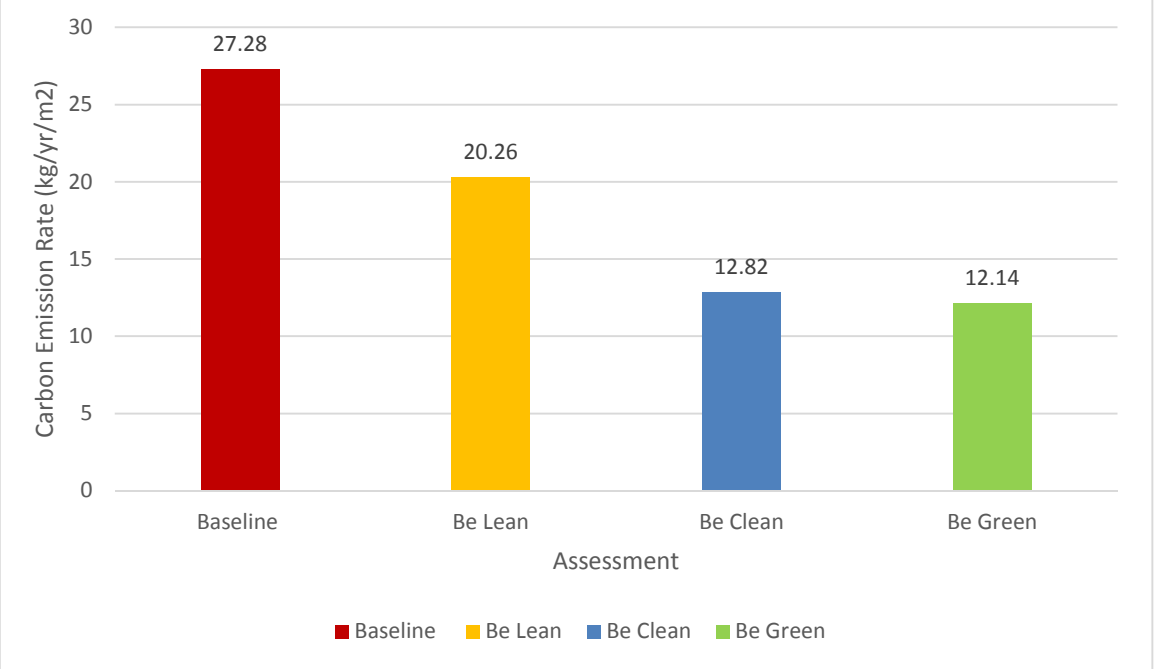


Fig. 9 Carbon Emission Rate

Appendix A – Preliminary ‘As Designed’ SAP Calculation



SAP Calculations

Client:

Project: 55, Sheldon Avenue
LONDON, N6 4NH

Contact: Luke Brehaut
Cooper Homewood Limited
lbrehaut@cooperhomewood.com

Cooper Homewood Ltd
1600 Parkway
Solent Business Park
Whiteley
PO15 7AH

Property Reference: 55 Sheldon Avenue
Survey Reference: Baseline Assessment
Property: 55, Sheldon Avenue, LONDON, N6 4NH

Issued on Date: 26.Jan.2016
Prop Type Ref:

SAP Rating:	72 C	**CO2 Emissions (t/year):**	24.57	**DER:** 27.31 Fail	**TER:** 13.47	**Percentage DER<TER:**	-102.82 %
Environmental:	66 D	**General Requirements Compliance:**	Fail	**DFEE:** 82.41 Fail	**TFEE:** 63.70	**Percentage DFEE<TFEE:**	-29.39 %

CfSH Results **Version:** November 2010 - June 2014 Addendum **ENE1 Credits:** 0.0 **ENE2 Credits:** 0.0 **ENE7 Credits:** 0 **CfSH Level:** 0

Surveyor: Luke Brehaut, Tel: 01489861481 Surveyor ID: E854-0002
Address: Solent Business Park, Whiteley, Fareham, Hampshire, PO15 7AH
Client:

Software Version: Elmhurst Energy Systems SAP2012 Calculator (Design System) version 3.03r13
SAP version: SAP 2012, Regs Region: England (Part L1A 2013), Calculation Type: New Build (As Designed)

ENE 1 calculation

Total floor area	998.65 m2
DER	27.31 kgCO2/yr/m2
TER	13.47 kgCO2/yr/m2
CO2 emissions offset from additional allowable electricity generation	0.00 kgCO2/yr/m2 (ZC7)
Residual CO2 emissions offset from biofuel CHP	0.00 kgCO2/yr/m2 (ZC5)
Total CO2 emissions offset from SAP Section 16 allowances	0.00 kgCO2/yr/m2
DER accounting for SAP Section 16 allowances	27.31 kgCO2/yr/m2
% reduction DER/TER	-102.82 %
CfSH ENE1 credits achieved	0.0
CfSH ENE1 level achieved	0

ENE 2 calculation

Dwelling type	House, Detached
Fabric energy efficiency (F.E.E.)	82.41
CfSH ENE2 credits achieved	0.0
CfSH ENE1 and 2 overall level achieved	0

ENE 7 calculation

Standard case CO2 emissions

Total floor area	998.65 m2	
DER	27.19 kgCO2/yr/m2	
CO2 emissions from electrical appliances	5.40 kgCO2/yr/m2	(ZC2)
CO2 emissions from cooking	0.22 kgCO2/yr/m2	(ZC3)
Standard case total CO2 emissions	32.81 kgCO2/yr/m2	(ZC4)
Net Standard case CO2 emissions	32.81 kgCO2/yr/m2	(ZC8)

Actual case CO2 emissions

DER	27.19 kgCO2/yr/m2	
CO2 emissions from electrical appliances	5.40 kgCO2/yr/m2	(ZC2)
CO2 emissions from cooking	0.22 kgCO2/yr/m2	(ZC3)
Actual case total CO2 emissions	32.81 kgCO2/yr/m2	(ZC4)
CO2 emissions from Biomass	0.00 kgCO2/yr/m2	(ZC5)
CO2 reduction from additional allowable electricity generation	0.00 kgCO2/yr/m2	(ZC7)
Net Actual case CO2 emissions	32.81 kgCO2/yr/m2	(ZC8)
% improvement in net actual/net standard case CO2 emissions	0 %	
ENE7 credits achieved	0	

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Cooper Homewood Ltd
1600 Parkway
Solent Business Park
Whiteley
PO15 7AH

COOPERHOMEWOOD
ENGINEERING CONSULTANCY

Building Regulation Compliance

Property Reference: 55 Sheldon Avenue
Survey Reference: Baseline Assessment
Property: 55, Sheldon Avenue, LONDON, N6 4NH

Issued on Date: 26.Jan.2016
Prop Type Ref:

SAP Rating: 72 C **CO2 Emissions (t/year):** 24.57 **DER:** 27.31 Fail **TER:** 13.47 **Percentage DER<TER:** -102.82 %
Environmental: 66 D **General Requirements Compliance:** Fail **DFEE:** 82.41 Fail **TFEE:** 63.70 **Percentage DFEE<TFEE:** -29.39 %

CfSH Results **Version:** November 2010 - June 2014 Addendum **ENE1 Credits:** 0.0 **ENE2 Credits:** 0.0 **ENE7 Credits:** 0 **CfSH Level:** 0

Surveyor: Luke Brehaut, Tel: 01489861481 Surveyor ID: E854-0002
Address: Solent Business Park, Whiteley, Fareham, Hampshire, PO15 7AH
Client:

Software Version: Elmhurst Energy Systems SAP2012 Calculator (Design System) version 3.03r13
SAP version: SAP 2012, Regs Region: England (Part L1A 2013), Calculation Type: New Build (As Designed)

SUMMARY FOR INPUT DATA FOR New Build (As Designed)

1a TER and DER

Fuel for main heating:	Mains gas	
Fuel factor:	1.00 (mains gas)	
Target Carbon Dioxide Emission Rate (TER)	13.47 kg/m^2	
Dwelling Carbon Dioxide Emission Rate (DER)	27.31 kg/m^2	
Excess emissions	13.84 kg/m^2 (103.0%)	Fail

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)	63.70 kWh/m^2	
Dwelling Fabric Energy Efficiency (DFEE)	82.41 kWh/m^2	
Excess energy	18.7 kWh/m^2 (29.4%)	Fail

2 Fabric U-values

Element	Average	Highest	
External wall	0.30 (max. 0.30)	0.30 (max. 0.70)	OK
Floor	0.25 (max. 0.25)	0.25 (max. 0.70)	OK
Roof	0.20 (max. 0.20)	0.20 (max. 0.35)	OK
Openings	2.00 (max. 2.00)	2.00 (max. 3.30)	OK

2a Thermal bridging

Thermal bridging calculated using default y-value of 0.15

3 Air permeability

Air permeability at 50 pascals:	10.00 (design value)	
Maximum	10.0	OK

4 Heating efficiency

Main heating system:	Boiler system with radiators or underfloor - Mains gas Data from manufacturer TBC TBC Efficiency: 88.0% SEDBUK2009 Minimum: 88.0%	OK
Secondary heating system:	None	

5 Cylinder insulation

Hot water storage	Nominal cylinder loss: 6.70 kWh/day Permitted by DBSCG 4.40	Fail
Primary pipework insulated:	Yes	OK

6 Controls

Space heating controls:	Programmer, room thermostat and TRVs	Fail (TFA > 150)
Hot water controls:	Cylinderstat	OK
	Independent timer for DHW	OK
Boiler interlock	Yes	OK

7 Low energy lights

Percentage of fixed lights with low-energy fittings:	75%	

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Minimum	75%	OK
8 Mechanical ventilation		
Continuous extract system (decentralised)		
Specific fan power:	0.80	
Maximum	0.7	Fail
9 Summertime temperature		
Overheating risk (Thames Valley):	Not significant	OK
Based On:		
Overshading:	Average	
Windows facing North:	13.66 m^2, No overhang	
Windows facing East:	46.91 m^2, No overhang	
Windows facing South:	32.13 m^2, No overhang	
Windows facing West:	57.59 m^2, No overhang	
Air change rate:	4.00 ach	
Blinds/curtains:	None	
10 Key features		
None		

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Predicted Energy Assessment

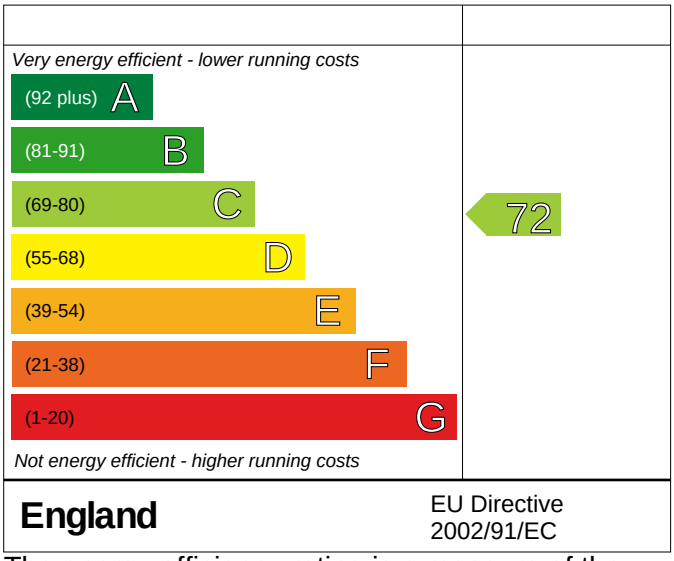
55, Sheldon Avenue,
LONDON,
N6 4NH

Dwelling type:	House, Detached
Date of assessment:	26.Jan.2016
Produced by:	Cooper Homewood Limited
Total floor area:	998.65 m^2

This document is a Predicted Energy Assessment for properties marketed when they are incomplete. It includes a predicted energy rating which might not represent the final energy rating of the property on completion. Once the property is completed, this rating will be updated and an official Energy Performance Certificate will be created for the property. This will include more detailed information about the energy performance of the completed property.

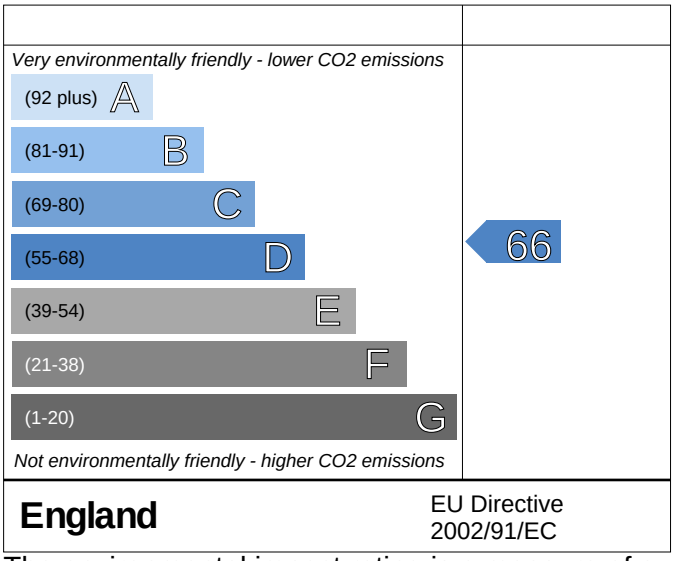
The energy performance has been assessed using the Government approved SAP2012 methodology and is rated in terms of the energy use per square meter of floor area; the energy efficiency is based on fuel costs and the environmental impact is based on carbon dioxide (CO2) emissions.

Energy Efficiency Rating



The energy efficiency rating is a measure of the overall efficiency of a home. The higher the rating the more energy efficient the home is and the lower the fuel bills are likely to be.

Environmental Impact (CO2) Rating



The environmental impact rating is a measure of a home's impact on the environment in terms of carbon dioxide (CO2) emissions. The higher the rating the less impact it has on the environment.

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Cooper Homewood Ltd
1600 Parkway
Solent Business Park
Whiteley
PO15 7AH

COOPERHOMEWOOD
ENGINEERING CONSULTANCY

Summary Information

Property Reference: 55 Sheldon Avenue **Issued on Date:** 26.Jan.2016
Survey Reference: Baseline Assessment **Prop Type Ref:**

Property: 55, Sheldon Avenue, LONDON, N6 4NH

SAP Rating: 72 C **CO2 Emissions (t/year):** 24.57 **DER:** 27.31 Fail **TER:** 13.47 **Percentage DER<TER:** -102.82 %
Environmental: 66 D **General Requirements Compliance:** Fail **DFEE:** 82.41 Fail **TFEE:** 63.70 **Percentage DFEE<TFEE:** -29.39 %

CfSH Results **Version:** November 2010 - June 2014 Addendum **ENE1 Credits:** 0.0 **ENE2 Credits:** 0.0 **ENE7 Credits:** 0 **CfSH Level:** 0

Surveyor: Luke Brehaut, Tel: 01489861481 Surveyor ID: E854-0002
Address: Solent Business Park, Whiteley, Fareham, Hampshire, PO15 7AH
Client:

Software Version: Elmhurst Energy Systems SAP2012 Calculator (Design System) version 3.03r13
SAP version: SAP 2012, Regs Region: England (Part L1A 2013), Calculation Type: New Build (As Designed)

SUMMARY FOR INPUT DATA FOR New Build (As Designed)

Orientation	East
1.0 Property Type	House, Detached
2.0 Number of Storeys	4
3.0 Date Built	2016
3.0 Property Age Band	
4.0 Sheltered Sides	3
5.0 Sunlight/Shade	Average or unknown

6.0 Measurements

	Heat Loss Perimeter	Internal Floor Area	Average Storey Height
Basement:	111.29	380.66	3.24
1st Storey:	70.82	277.36	4.10
2nd Storey:	63.20	210.49	3.30
3rd Storey:	45.75	130.14	2.75

7.0 Living Area	111.30
8.0 Thermal Mass Parameter	Simple calculation - Medium

9.0 External Walls

Description	Construction	U-Value	Kappa	Gross Area	Nett Area
Basement External Wall	Cavity wall; plasterboard on dabs or battens, lightweight aggregate block, filled cavity, any outside structure	0.30		360.58	360.58
External Wall	Cavity wall; plasterboard on dabs or battens, lightweight aggregate block, filled cavity, any outside structure	0.30		537.81	380.74

10.0 External Roofs

Description	Construction	U-Value	Kappa	Gross Area	Nett Area
Basement Flat Roof	Plasterboard, insulated flat roof	0.20		125.22	119.62
Ground Floor Flat Roof	Plasterboard, insulated flat roof	0.20		52.46	43.95
First Floor Flat Roof	Plasterboard, insulated flat roof	0.20		26.24	26.24
Second Floor Flat Roof	Plasterboard, insulated flat roof	0.20		64.35	59.13
Pitched Roof	Plasterboard, insulated slope	0.20		96.62	96.62

11.0 HeatLoss Floors

Description	Construction	U-Value	Kappa	Area
Basement Floor	Slab on ground, screed over insulation	0.25		349.28
Ground Floor	Slab on ground, screed over insulation	0.25		31.38

12.0 Opening Types

Description	Data Source	Type	Glazing	Glazing Gap	Argon Filled	Solar Trans	Frame Type	Frame Factor	U value
Windows	Manufacturer	Window	Double Low-E Soft 0.05			0.63		0.70	2.00
Roof Lights	Manufacturer	Roof Window	Double Low-E Soft 0.05			0.63		0.70	2.00
Front Door	Manufacturer	Solid Door							2.00

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13.0 Openings

Name	Opening Type	Location	Orientation	Curtain Type	Overhang Ratio	Wide Overhang	Width	Height	Count	Area	Curtain Closed
South Glazing	Window	[2] External Wall	South	None	0.00					32.13	
Rear Door	Solid Door	[2] External Wall	South							3.17	
East Glazing	Window	[2] External Wall	East	None	0.00					46.91	
Front Door	Solid Door	[2] External Wall	East							3.61	
North Glazing	Window	[2] External Wall	North	None	0.00					13.66	
West Glazing	Window	[2] External Wall	West	None	0.00					57.59	
Basement Rooflight	Roof Window	[1] Basement Flat Roof	Horizontal	None						5.60	
Ground Rooflight	Roof Window	[2] Ground Floor Flat Roof	Horizontal	None						8.51	
Second Flr Rooflight	Roof Window	[4] Second Floor Flat Roof	Horizontal	None						5.22	

14.0 Conservatory: None
15.0 Draught Proofing: 100
16.0 Draught Lobby: No

17.0 Thermal Bridging: Default
- Y-value: 0.150
- Description:

18.0 Pressure Testing: Yes
- Designed q50: 10.00
- Property Tested ?:
- As Built q50:
- Same As Designed ?:

19.0 Mechanical Ventilation
- Mechanical Ventilation System Present: Yes
- Approved Installation:
- Windows open in hot weather: Windows half open
- Cross ventilation possible: Yes
- Night Ventilation: Yes
- Air change rate: 4.00
- Mechanical Ventilation data Type: Defaults
- Type: Mechanical extract ventilation - decentralised
- MV Reference Number:
- Configuration:
- MVHR Duct Insulated:
- Manufacturer SFP:
- Duct Type:
- MVHR Efficiency:
- Wet Rooms:
- Brand, Model:

20.0 Fans, Open Fireplaces, Flues

	MHS	SHS	Other	Total
Number of Chimneys	0		0	0
Number of open flues	0		0	0
Number of intermittent fans				0
Number of passive vents				0
Number of flueless gas fires				0

21.0 Cooling System: No

22.0 Lighting
- Internal
  - Total number of light fittings: 100
  - Total number of L.E.L. fittings: 75
  - Percentage of L.E.L. fittings: 75.00
- External
  - External lights fitted: Yes
  - Light and motion sensors: Yes

23.0 Electricity Tariff: Standard

24.0 Heating Systems
- Main Heating 1: Manufacturer
  - Description: Gas Fired Boiler
  - Percentage of Heat: 100 %
- Main Heating 2: None
  - Description:
  - Percentage of Heat: %
- Community Heating:
- Secondary Heating: None
- Water Heating: Main Heating 1

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Flue Gas Heat Recovery System	No
Waste Water Heat Recovery	No
Instantaneous System 1	
Waste Water Heat Recovery	No
Instantaneous System 2	
Waste Water Heat Recovery Storage System	No
Solar Panel	No
25.0 Main Heating 1	
Database Ref. No.	
Fuel Type	
Main Heating	BGD
TestMethod	
SAP Code	106
Efficiency (Sedbuk 2009) %	88.0
Efficiency (Sedbuk 2009) %	
In Winter	
In Summer	
Model Name	TBC
Manufacturer	TBC
Controls	CBE Programmer, room thermostat and TRVs
PCDF Controls	0
Delayed Start Stat	No
Sap Code	2106
Burner Control	On/Off
Boiler Compensator	
HETAS approved System	
Oil Pump Inside	
FI Case	
FI Water	
Flue Type	Balanced
Smoke Control Area	
Fan Assisted Flue	Yes
Is MHS Pumped	Pump in heated space
Heat Emitter	Radiators
Underfloor Heating	
Flow Temperature	
Electric CPSU Temperature	
Combi boiler type	
Combi keep hot type	
Combi store type	
27.0 Community Heating	
Space Community Heating	
PCDF Index	
Distribution Loss	
Distribution Loss Value	
Controls	
SAP Code	
Water Community Heating	
PCDF Index	
Distribution Loss	
Distribution Loss Value	
Charging Linked To Heat Use	
28.0 Secondary Heating	
Description	
SHS efficiency %	
SAP Code	
HETAS Approved System	
Smoke Control Area	
Test Method	
Manufacturer	
Model Name	
29.0 Water Heating	HWP From main heating 1
Water use <= 125 litres/person/day	Yes
SAP Code	901
Immersion Heater	
Summer Immersion	
Suplementary Immersion	
Immersion Only Heating Hot Water	
29.1 Flue Gas Heat Recovery System	
Database ID	
Brand Model	
Details	
29.2 Waste Water Heat Recovery System	
Total rooms with shower and/or bath	

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30.0 Hot Water Cylinder	Hot Water Cylinder
Cylinder Stat	Yes
Cylinder In Heated Space	Yes
Independent Time Control	Yes
Insulation Type	Foam
Insulation Thickness	
Cylinder Volume	600.00
Loss (kwh/day)	
Pipes insulation	Fully insulated primary pipework
In Airing Cupboard	
31.0 Solar Panel	
Solar Panel Area	
Area Type	
Panel Type	
n0, a1, a2, A/G ratio	
Orientation	
Elevation	
Overshading	
Solar Storage Volume	
Pump electrically powered	
Combined Cylinder	
32.0 Thermal Store	None
Thermal Store Pipework	
33.0 Photovoltaic Unit	
Apportioned KWh/Year	
34.0 Wind Turbines	
Terrain Type	Urban
Wind Turbines	
Count	
Apportioned Kwh/year	
Rotor Diameter	
Hub Height	
35.0 Small-scale Hydro	
Electricity Generated	
Description	
Apportioned kWh/Year	

Recommendations

None

Further measures to achieve even higher standards

None

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SAP Calculations

Client:

Project: 55, Sheldon Avenue
LONDON, N6 4NH

Contact: Luke Brehaut
Cooper Homewood Limited
lbrehaut@cooperhomewood.com

Cooper Homewood Ltd
1600 Parkway
Solent Business Park
Whiteley
PO15 7AH

Property Reference: 55 Sheldon Avenue
Survey Reference: Be Lean Assessment
Issued on Date: 26.Jan.2016
Prop Type Ref:

Property: 55, Sheldon Avenue, LONDON, N6 4NH

SAP Rating:	79 C	**CO2 Emissions (t/year):**	18.17	**DER:**	20.26 Fail	**TER:**	13.00	**Percentage DER<TER:**	-55.89 %
Environmental:	75 C	**General Requirements Compliance:**	Fail	**DFEE:**	59.75 Pass	**TFEE:**	61.20	**Percentage DFEE<TFEE:**	2.36 %

CfSH Results **Version:** November 2010 - June 2014 Addendum **ENE1 Credits:** 0.0 **ENE2 Credits:** 3.0 **ENE7 Credits:** 0 **CfSH Level:** 0

Surveyor: Luke Brehaut, Tel: 01489861481 Surveyor ID: E854-0002
Address: Solent Business Park, Whiteley, Fareham, Hampshire, PO15 7AH
Client:

Software Version: Elmhurst Energy Systems SAP2012 Calculator (Design System) version 3.03r13
SAP version: SAP 2012, Regs Region: England (Part L1A 2013), Calculation Type: New Build (As Designed)

ENE 1 calculation

Total floor area	998.65 m2
DER	20.26 kgCO2/yr/m2
TER	13.00 kgCO2/yr/m2
CO2 emissions offset from additional allowable electricity generation	0.00 kgCO2/yr/m2 (ZC7)
Residual CO2 emissions offset from biofuel CHP	0.00 kgCO2/yr/m2 (ZC5)
Total CO2 emissions offset from SAP Section 16 allowances	0.00 kgCO2/yr/m2
DER accounting for SAP Section 16 allowances	20.26 kgCO2/yr/m2
% reduction DER/TER	-55.89 %
CfSH ENE1 credits achieved	0.0
CfSH ENE1 level achieved	0

ENE 2 calculation

Dwelling type	House, Detached
Fabric energy efficiency (F.E.E.)	59.75
CfSH ENE2 credits achieved	3.0
CfSH ENE1 and 2 overall level achieved	0

ENE 7 calculation

Standard case CO2 emissions

Total floor area	998.65 m2	
DER	20.14 kgCO2/yr/m2	
CO2 emissions from electrical appliances	5.40 kgCO2/yr/m2	(ZC2)
CO2 emissions from cooking	0.22 kgCO2/yr/m2	(ZC3)
Standard case total CO2 emissions	25.76 kgCO2/yr/m2	(ZC4)
Net Standard case CO2 emissions	25.76 kgCO2/yr/m2	(ZC8)

Actual case CO2 emissions

DER	20.14 kgCO2/yr/m2	
CO2 emissions from electrical appliances	5.40 kgCO2/yr/m2	(ZC2)
CO2 emissions from cooking	0.22 kgCO2/yr/m2	(ZC3)
Actual case total CO2 emissions	25.76 kgCO2/yr/m2	(ZC4)
CO2 emissions from Biomass	0.00 kgCO2/yr/m2	(ZC5)
CO2 reduction from additional allowable electricity generation	0.00 kgCO2/yr/m2	(ZC7)
Net Actual case CO2 emissions	25.76 kgCO2/yr/m2	(ZC8)
% improvement in net actual/net standard case CO2 emissions	0 %	
ENE7 credits achieved	0	

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Cooper Homewood Ltd
1600 Parkway
Solent Business Park
Whiteley
PO15 7AH

COOPERHOMEWOOD
ENGINEERING CONSULTANCY

Building Regulation Compliance

Property Reference: 55 Sheldon Avenue
Survey Reference: Be Lean Assessment
Property: 55, Sheldon Avenue, LONDON, N6 4NH

Issued on Date: 26.Jan.2016
Prop Type Ref:

SAP Rating: 79 C **CO2 Emissions (t/year):** 18.17 **DER:** 20.26 Fail **TER:** 13.00 **Percentage DER<TER:** -55.89 %
Environmental: 75 C **General Requirements Compliance:** Fail **DFEE:** 59.75 Pass **TFEE:** 61.20 **Percentage DFEE<TFEE:** 2.36 %

CfSH Results **Version:** November 2010 - June 2014 Addendum **ENE1 Credits:** 0.0 **ENE2 Credits:** 3.0 **ENE7 Credits:** 0 **CfSH Level:** 0

Surveyor: Luke Brehaut, Tel: 01489861481 Surveyor ID: E854-0002
Address: Solent Business Park, Whiteley, Fareham, Hampshire, PO15 7AH
Client:

Software Version: Elmhurst Energy Systems SAP2012 Calculator (Design System) version 3.03r13
SAP version: SAP 2012, Regs Region: England (Part L1A 2013), Calculation Type: New Build (As Designed)

SUMMARY FOR INPUT DATA FOR New Build (As Designed)

1a TER and DER

Fuel for main heating:	Mains gas	
Fuel factor:	1.00 (mains gas)	
Target Carbon Dioxide Emission Rate (TER)	13.00 kg/m^2	
Dwelling Carbon Dioxide Emission Rate (DER)	20.26 kg/m^2	
Excess emissions	7.26 kg/m^2 (55.8%)	Fail

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)	61.20 kWh/m^2	
Dwelling Fabric Energy Efficiency (DFEE)	59.75 kWh/m^2	OK

2 Fabric U-values

Element	Average	Highest	
External wall	0.15 (max. 0.30)	0.15 (max. 0.70)	OK
Floor	0.15 (max. 0.25)	0.15 (max. 0.70)	OK
Roof	0.16 (max. 0.20)	0.16 (max. 0.35)	OK
Openings	1.51 (max. 2.00)	1.80 (max. 3.30)	OK

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

Air permeability at 50 pascals:	3.00 (design value)	
Maximum	10.0	OK

4 Heating efficiency

Main heating system:	Boiler system with radiators or underfloor - Mains gas Data from manufacturer TBC TBC Efficiency: 88.0% SEDBUK2009 Minimum: 88.0%	OK
Secondary heating system:	None	

5 Cylinder insulation

Hot water storage	Nominal cylinder loss: 6.70 kWh/day Permitted by DBSCG 4.40	Fail
Primary pipework insulated:	Yes	OK

6 Controls

Space heating controls:	Programmer, room thermostat and TRVs	Fail (TFA > 150)
Hot water controls:	Cylinderstat	OK
	Independent timer for DHW	OK
Boiler interlock	Yes	OK

7 Low energy lights

Percentage of fixed lights with low-energy fittings:	75%	

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Minimum	75%	OK
8 Mechanical ventilation		
Continuous extract system (decentralised)		
Specific fan power:	0.80	
Maximum	0.7	Fail
9 Summertime temperature		
Overheating risk (Thames Valley):	Not significant	OK
Based On:		
Overshading:	Average	
Windows facing North:	13.66 m^2, No overhang	
Windows facing East:	46.91 m^2, No overhang	
Windows facing South:	32.13 m^2, No overhang	
Windows facing West:	57.59 m^2, No overhang	
Air change rate:	4.00 ach	
Blinds/curtains:	None	
10 Key features		
Air permeability	3.0 m^3/m^2h	

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Predicted Energy Assessment

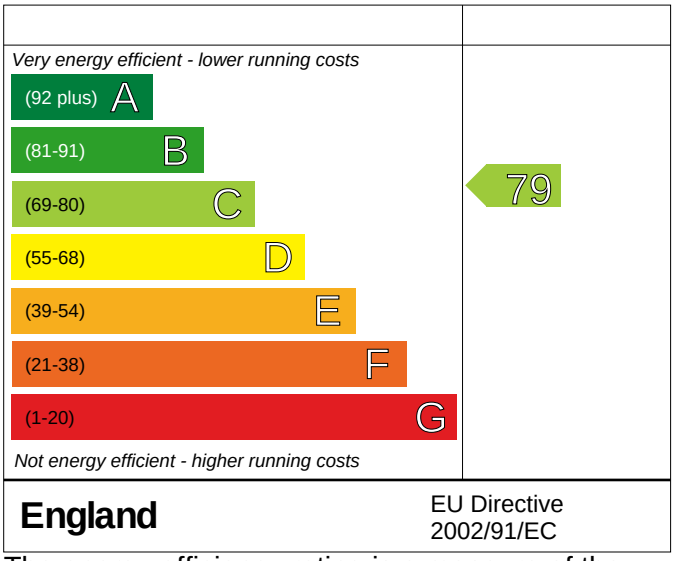
55, Sheldon Avenue,
LONDON,
N6 4NH

Dwelling type:	House, Detached
Date of assessment:	26.Jan.2016
Produced by:	Cooper Homewood Limited
Total floor area:	998.65 m^2

This document is a Predicted Energy Assessment for properties marketed when they are incomplete. It includes a predicted energy rating which might not represent the final energy rating of the property on completion. Once the property is completed, this rating will be updated and an official Energy Performance Certificate will be created for the property. This will include more detailed information about the energy performance of the completed property.

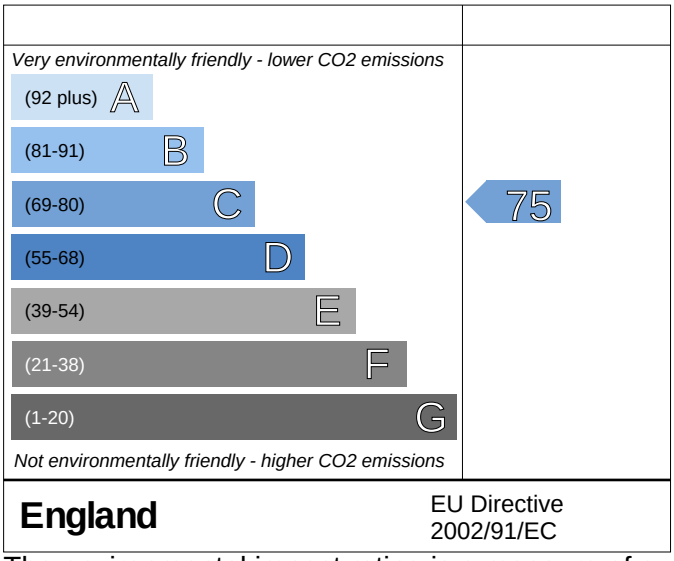
The energy performance has been assessed using the Government approved SAP2012 methodology and is rated in terms of the energy use per square meter of floor area; the energy efficiency is based on fuel costs and the environmental impact is based on carbon dioxide (CO2) emissions.

Energy Efficiency Rating



The energy efficiency rating is a measure of the overall efficiency of a home. The higher the rating the more energy efficient the home is and the lower the fuel bills are likely to be.

Environmental Impact (CO2) Rating



The environmental impact rating is a measure of a home's impact on the environment in terms of carbon dioxide (CO2) emissions. The higher the rating the less impact it has on the environment.

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Cooper Homewood Ltd
1600 Parkway
Solent Business Park
Whiteley
PO15 7AH

Summary Information

Property Reference: 55 Sheldon Avenue
Survey Reference: Be Lean Assessment
Issued on Date: 26.Jan.2016
Prop Type Ref:

Property: 55, Sheldon Avenue, LONDON, N6 4NH

SAP Rating: 79 C **CO2 Emissions (t/year):** 18.17 **DER:** 20.26 Fail **TER:** 13.00 **Percentage DER<TER:** -55.89 %
Environmental: 75 C **General Requirements Compliance:** Fail **DFEE:** 59.75 Pass **TFEE:** 61.20 **Percentage DFEE<TFEE:** 2.36 %

CfSH Results **Version:** November 2010 - June 2014 Addendum **ENE1 Credits:** 0.0 **ENE2 Credits:** 3.0 **ENE7 Credits:** 0 **CfSH Level:** 0

Surveyor: Luke Brehaut, Tel: 01489861481 Surveyor ID: E854-0002
Address: Solent Business Park, Whiteley, Fareham, Hampshire, PO15 7AH
Client:

Software Version: Elmhurst Energy Systems SAP2012 Calculator (Design System) version 3.03r13
SAP version: SAP 2012, Regs Region: England (Part L1A 2013), Calculation Type: New Build (As Designed)

SUMMARY FOR INPUT DATA FOR New Build (As Designed)

Orientation	East
1.0 Property Type	House, Detached
2.0 Number of Storeys	4
3.0 Date Built	2016
3.0 Property Age Band	
4.0 Sheltered Sides	3
5.0 Sunlight/Shade	Average or unknown

6.0 Measurements

	Heat Loss Perimeter	Internal Floor Area	Average Storey Height
Basement:	111.29	380.66	3.24
1st Storey:	70.82	277.36	4.10
2nd Storey:	63.20	210.49	3.30
3rd Storey:	45.75	130.14	2.75

7.0 Living Area	111.30
8.0 Thermal Mass Parameter	Simple calculation - Medium

9.0 External Walls

Description	Construction	U-Value	Kappa	Gross Area	Nett Area
Basement External Wall	Cavity wall; plasterboard on dabs or battens, lightweight aggregate block, filled cavity, any outside structure	0.15		360.58	360.58
External Wall	Cavity wall; plasterboard on dabs or battens, lightweight aggregate block, filled cavity, any outside structure	0.15		537.81	380.74

10.0 External Roofs

Description	Construction	U-Value	Kappa	Gross Area	Nett Area
Basement Flat Roof	Plasterboard, insulated flat roof	0.16		125.22	119.62
Ground Floor Flat Roof	Plasterboard, insulated flat roof	0.16		52.46	43.95
First Floor Flat Roof	Plasterboard, insulated flat roof	0.16		26.24	26.24
Second Floor Flat Roof	Plasterboard, insulated flat roof	0.16		64.35	59.13
Pitched Roof	Plasterboard, insulated slope	0.16		96.62	96.62

11.0 HeatLoss Floors

Description	Construction	U-Value	Kappa	Area
Basement Floor	Slab on ground, screed over insulation	0.15		349.28
Ground Floor	Slab on ground, screed over insulation	0.15		31.38

12.0 Opening Types

Description	Data Source	Type	Glazing	Glazing Gap	Argon Filled	Solar Trans	Frame Type	Frame Factor	U value
Windows	Manufacturer	Window	Double Low-E Soft 0.05			0.63		0.70	1.50
Roof Lights	Manufacturer	Roof Window	Double Low-E Soft 0.05			0.63		0.70	1.50
Front Door	Manufacturer	Solid Door							1.80

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13.0 Openings

Name	Opening Type	Location	Orientation	Curtain Type	Overhang Ratio	Wide Overhang	Width	Height	Count	Area	Curtain Closed
South Glazing	Window	[2] External Wall	South	None	0.00					32.13	
Rear Door	Solid Door	[2] External Wall	South							3.17	
East Glazing	Window	[2] External Wall	East	None	0.00					46.91	
Front Door	Solid Door	[2] External Wall	East							3.61	
North Glazing	Window	[2] External Wall	North	None	0.00					13.66	
West Glazing	Window	[2] External Wall	West	None	0.00					57.59	
Basement Rooflight	Roof Window	[1] Basement Flat Roof	Horizontal	None						5.60	
Ground Rooflight	Roof Window	[2] Ground Floor Flat Roof	Horizontal	None						8.51	
Second Flr Rooflight	Roof Window	[4] Second Floor Flat Roof	Horizontal	None						5.22	

14.0 Conservatory: None
15.0 Draught Proofing: 100
16.0 Draught Lobby: No

17.0 Thermal Bridging: Calculate Bridges

17.1 List of Bridges

Source Type	Bridge Type	Length	Psi	Imported
Table K1 - Default	E1 Steel lintel with perforated steel base plate	67.52	1.000	Yes
Table K1 - Default	E3 Sill	64.87	0.080	Yes
Table K1 - Default	E4 Jamb	236.16	0.100	Yes
Table K1 - Default	E5 Ground floor (normal)	111.29	0.320	Yes
Table K1 - Default	E6 Intermediate floor within a dwelling	179.77	0.140	Yes
Table K1 - Default	E16 Corner (normal)	53.56	0.180	Yes
Table K1 - Default	R1 Head of roof window	4.97	0.080	Yes
Table K1 - Default	R2 Sill of roof window	4.97	0.060	Yes
Table K1 - Default	R3 Jamb of roof window	23.62	0.080	Yes

18.0 Pressure Testing: Yes
- Designed q50: 3.00
- Property Tested ?:
- As Built q50:
- Same As Designed ?:

19.0 Mechanical Ventilation
- Mechanical Ventilation System Present: Yes
- Approved Installation:
- Windows open in hot weather: Windows half open
- Cross ventilation possible: Yes
- Night Ventilation: Yes
- Air change rate: 4.00
- Mechanical Ventilation data Type: Defaults
- Type: Mechanical extract ventilation - decentralised
- MV Reference Number:
- Configuration:
- MVHR Duct Insulated:
- Manufacturer SFP:
- Duct Type:
- MVHR Efficiency:
- Wet Rooms:
- Brand, Model:

20.0 Fans, Open Fireplaces, Flues

	MHS	SHS	Other	Total
Number of Chimneys	0		0	0
Number of open flues	0		0	0
Number of intermittent fans				0
Number of passive vents				0
Number of flueless gas fires				0

21.0 Cooling System: No

22.0 Lighting
- Internal
  - Total number of light fittings: 100
  - Total number of L.E.L. fittings: 75
  - Percentage of L.E.L. fittings: 75.00
- External
  - External lights fitted: Yes

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Light and motion sensors	Yes
23.0 Electricity Tariff	Standard
24.0 Heating Systems	
Main Heating 1	Manufacturer
Description	Gas Fired Boiler
Percentage of Heat	100 %
Main Heating 2	None
Description	
Percentage of Heat	%
Community Heating	
Secondary Heating	None
Water Heating	Main Heating 1
Flue Gas Heat Recovery System	No
Waste Water Heat Recovery	No
Instantaneous System 1	
Waste Water Heat Recovery	No
Instantaneous System 2	
Waste Water Heat Recovery Storage System	No
Solar Panel	No
25.0 Main Heating 1	
Database Ref. No.	
Fuel Type	
Main Heating	BGD
TestMethod	
SAP Code	106
Efficiency (Sedbuk 2009) %	88.0
Efficiency (Sedbuk 2009) %	
In Winter	
In Summer	
Model Name	TBC
Manufacturer	TBC
Controls	CBE Programmer, room thermostat and TRVs
PCDF Controls	0
Delayed Start Stat	No
Sap Code	2106
Burner Control	On/Off
Boiler Compensator	
HETAS approved System	
Oil Pump Inside	
FI Case	
FI Water	
Flue Type	Balanced
Smoke Control Area	
Fan Assisted Flue	Yes
Is MHS Pumped	Pump in heated space
Heat Emitter	Radiators
Underfloor Heating	
Flow Temperature	
Electric CPSU Temperature	
Combi boiler type	
Combi keep hot type	
Combi store type	
27.0 Community Heating	
Space Community Heating	
PCDF Index	
Distribution Loss	
Distribution Loss Value	
Controls	
SAP Code	
Water Community Heating	
PCDF Index	
Distribution Loss	
Distribution Loss Value	
Charging Linked To Heat Use	
28.0 Secondary Heating	
Description	
SHS efficiency %	
SAP Code	
HETAS Approved System	
Smoke Control Area	
Test Method	
Manufacturer	
Model Name	
29.0 Water Heating	HWP From main heating 1
Water use <= 125 litres/person/day	Yes

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SAP Code	901
Immersion Heater	
Summer Immersion	
Suplementary Immersion	
Immersion Only Heating Hot Water	
29.1 Flue Gas Heat Recovery System	
Database ID	
Brand Model	
Details	
29.2 Waste Water Heat Recovery System	
Total rooms with shower and/or bath	
30.0 Hot Water Cylinder	Hot Water Cylinder
Cylinder Stat	Yes
Cylinder In Heated Space	Yes
Independent Time Control	Yes
Insulation Type	Foam
Insulation Thickness	
Cylinder Volume	600.00
Loss (kwh/day)	
Pipes insulation	Fully insulated primary pipework
In Airing Cupboard	
31.0 Solar Panel	
Solar Panel Area	
Area Type	
Panel Type	
n0, a1, a2, A/G ratio	
Orientation	
Elevation	
Overshading	
Solar Storage Volume	
Pump electrically powered	
Combined Cylinder	
32.0 Thermal Store	None
Thermal Store Pipework	
33.0 Photovoltaic Unit	
Apportioned KWh/Year	
34.0 Wind Turbines	
Terrain Type	Urban
Wind Turbines	
Count	
Apportioned Kwh/year	
Rotor Diameter	
Hub Height	
35.0 Small-scale Hydro	
Electricity Generated	
Description	
Apportioned kWh/Year	

Recommendations

None

Further measures to achieve even higher standards

None

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SAP Calculations

Client:

Project: 55, Sheldon Avenue
LONDON, N6 4NH

Contact: Luke Brehaut
Cooper Homewood Limited
lbrehaut@cooperhomewood.com

Cooper Homewood Ltd
1600 Parkway
Solent Business Park
Whiteley
PO15 7AH

Property Reference: 55 Sheldon Avenue
Survey Reference: Be Clean Assessment
Issued on Date: 26.Jan.2016
Prop Type Ref:

Property: 55, Sheldon Avenue, LONDON, N6 4NH

SAP Rating:	87 B	**CO2 Emissions (t/year):**	11.24	**DER:**	12.82 Pass	**TER:**	13.00	**Percentage DER<TER:**	1.36 %
Environmental:	84 B	**General Requirements Compliance:**	Pass	**DFEE:**	59.75 Pass	**TFEE:**	61.20	**Percentage DFEE<TFEE:**	2.36 %

CfSH Results **Version:** November 2010 - June 2014 Addendum **ENE1 Credits:** 0.2 **ENE2 Credits:** 3.0 **ENE7 Credits:** 0 **CfSH Level:** 3

Surveyor: Luke Brehaut, Tel: 01489861481 Surveyor ID: E854-0002
Address: Solent Business Park, Whiteley, Fareham, Hampshire, PO15 7AH
Client:

Software Version: Elmhurst Energy Systems SAP2012 Calculator (Design System) version 3.03r13
SAP version: SAP 2012, Regs Region: England (Part L1A 2013), Calculation Type: New Build (As Designed)

ENE 1 calculation

Total floor area	998.65 m2
DER	12.82 kgCO2/yr/m2
TER	13.00 kgCO2/yr/m2
CO2 emissions offset from additional allowable electricity generation	0.00 kgCO2/yr/m2 (ZC7)
Residual CO2 emissions offset from biofuel CHP	0.00 kgCO2/yr/m2 (ZC5)
Total CO2 emissions offset from SAP Section 16 allowances	0.00 kgCO2/yr/m2
DER accounting for SAP Section 16 allowances	12.82 kgCO2/yr/m2
% reduction DER/TER	1.36 %
CfSH ENE1 credits achieved	0.2
CfSH ENE1 level achieved	3

ENE 2 calculation

Dwelling type	House, Detached
Fabric energy efficiency (F.E.E.)	59.75
CfSH ENE2 credits achieved	3.0
CfSH ENE1 and 2 overall level achieved	3

ENE 7 calculation

Standard case CO2 emissions

Total floor area	998.65 m2	
DER	14.07 kgCO2/yr/m2	
CO2 emissions from electrical appliances	5.40 kgCO2/yr/m2	(ZC2)
CO2 emissions from cooking	0.22 kgCO2/yr/m2	(ZC3)
Standard case total CO2 emissions	19.69 kgCO2/yr/m2	(ZC4)
Net Standard case CO2 emissions	19.69 kgCO2/yr/m2	(ZC8)

Actual case CO2 emissions

DER	14.07 kgCO2/yr/m2	
CO2 emissions from electrical appliances	5.40 kgCO2/yr/m2	(ZC2)
CO2 emissions from cooking	0.22 kgCO2/yr/m2	(ZC3)
Actual case total CO2 emissions	19.69 kgCO2/yr/m2	(ZC4)
CO2 emissions from Biomass	0.00 kgCO2/yr/m2	(ZC5)
CO2 reduction from additional allowable electricity generation	0.00 kgCO2/yr/m2	(ZC7)
Net Actual case CO2 emissions	19.69 kgCO2/yr/m2	(ZC8)
% improvement in net actual/net standard case CO2 emissions	0 %	
ENE7 credits achieved	0	

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Cooper Homewood Ltd
1600 Parkway
Solent Business Park
Whiteley
PO15 7AH

COOPERHOMEWOOD
ENGINEERING CONSULTANCY

Building Regulation Compliance

Property Reference: 55 Sheldon Avenue
Survey Reference: Be Clean Assessment
Property: 55, Sheldon Avenue, LONDON, N6 4NH

Issued on Date: 26.Jan.2016
Prop Type Ref:

SAP Rating: 87 B **CO2 Emissions (t/year):** 11.24 **DER:** 12.82 Pass **TER:** 13.00 **Percentage DER<TER:** 1.36 %
Environmental: 84 B **General Requirements Compliance:** Pass **DFEE:** 59.75 Pass **TFEE:** 61.20 **Percentage DFEE<TFEE:** 2.36 %

CfSH Results **Version:** November 2010 - June 2014 Addendum **ENE1 Credits:** 0.2 **ENE2 Credits:** 3.0 **ENE7 Credits:** 0 **CfSH Level:** 3

Surveyor: Luke Brehaut, Tel: 01489861481 Surveyor ID: E854-0002
Address: Solent Business Park, Whiteley, Fareham, Hampshire, PO15 7AH
Client:

Software Version: Elmhurst Energy Systems SAP2012 Calculator (Design System) version 3.03r13
SAP version: SAP 2012, Regs Region: England (Part L1A 2013), Calculation Type: New Build (As Designed)

SUMMARY FOR INPUT DATA FOR New Build (As Designed)

1a TER and DER

Fuel for main heating:	Mains gas	
Fuel factor:	1.00 (mains gas)	
Target Carbon Dioxide Emission Rate (TER)	13.00 kg/m^2	
Dwelling Carbon Dioxide Emission Rate (DER)	12.82 kg/m^2	OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)	61.20 kWh/m^2	
Dwelling Fabric Energy Efficiency (DFEE)	59.75 kWh/m^2	OK

2 Fabric U-values

Element	Average	Highest	
External wall	0.15 (max. 0.30)	0.15 (max. 0.70)	OK
Floor	0.15 (max. 0.25)	0.15 (max. 0.70)	OK
Roof	0.16 (max. 0.20)	0.16 (max. 0.35)	OK
Openings	1.51 (max. 2.00)	1.80 (max. 3.30)	OK

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

Air permeability at 50 pascals:	3.00 (design value)	
Maximum	10.0	OK

4 Heating efficiency

Main heating system:	Boiler system with radiators or underfloor - Mains gas Data from manufacturer MHS Thision Efficiency: 94.0% SEDBUK2009 Minimum: 88.0%	OK
Secondary heating system:	None	

5 Cylinder insulation

Hot water storage	Nominal cylinder loss: 4.05 kWh/day Permitted by DBSCG 4.40	OK
Primary pipework insulated:	Yes	OK

6 Controls

Space heating controls:	Time and temperature zone control	OK
Hot water controls:	Cylinderstat	OK
	Independent timer for DHW	OK
Boiler interlock	Yes	OK

7 Low energy lights

Percentage of fixed lights with low-energy fittings:	100%	
Minimum	75%	OK

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8 Mechanical ventilation

Continuous supply and extract system		
Specific fan power:	0.79	
Maximum	1.5	OK
MVHR efficiency:	87%	
Minimum:	70%	OK

9 Summertime temperature

Overheating risk (Thames Valley):	Not significant	OK
Based On:		
Overshading:	Average	
Windows facing North:	13.66 m^2, No overhang	
Windows facing East:	46.91 m^2, No overhang	
Windows facing South:	32.13 m^2, No overhang	
Windows facing West:	57.59 m^2, No overhang	
Air change rate:	4.00 ach	
Blinds/curtains:	None	

10 Key features

Air permeability	3.0 m^3/m^2h

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Predicted Energy Assessment

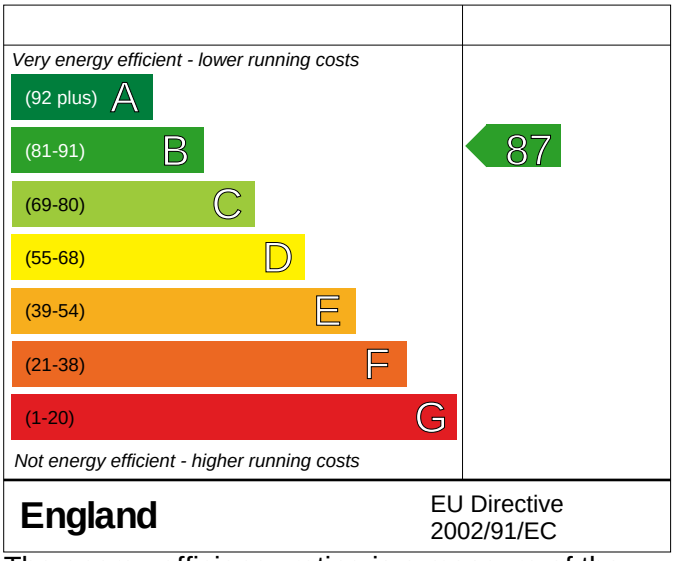
55, Sheldon Avenue,
LONDON,
N6 4NH

Dwelling type:	House, Detached
Date of assessment:	26.Jan.2016
Produced by:	Cooper Homewood Limited
Total floor area:	998.65 m^2

This document is a Predicted Energy Assessment for properties marketed when they are incomplete. It includes a predicted energy rating which might not represent the final energy rating of the property on completion. Once the property is completed, this rating will be updated and an official Energy Performance Certificate will be created for the property. This will include more detailed information about the energy performance of the completed property.

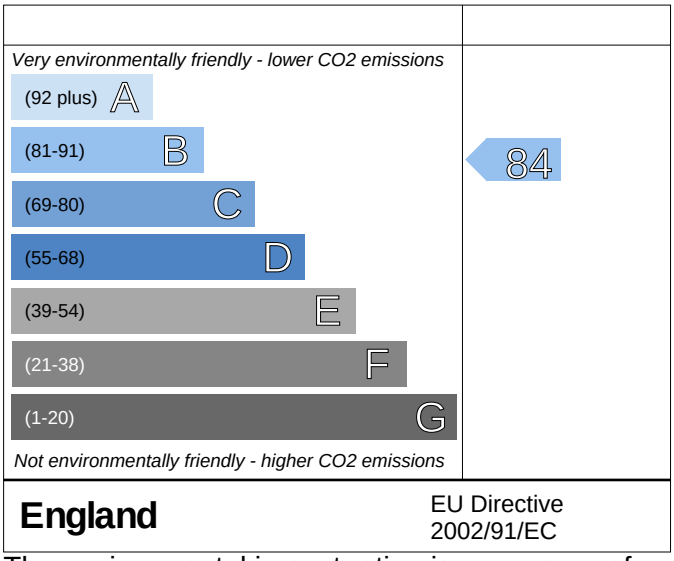
The energy performance has been assessed using the Government approved SAP2012 methodology and is rated in terms of the energy use per square meter of floor area; the energy efficiency is based on fuel costs and the environmental impact is based on carbon dioxide (CO2) emissions.

Energy Efficiency Rating



The energy efficiency rating is a measure of the overall efficiency of a home. The higher the rating the more energy efficient the home is and the lower the fuel bills are likely to be.

Environmental Impact (CO2) Rating



The environmental impact rating is a measure of a home's impact on the environment in terms of carbon dioxide (CO2) emissions. The higher the rating the less impact it has on the environment.

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Cooper Homewood Ltd
1600 Parkway
Solent Business Park
Whiteley
PO15 7AH

Summary Information

Property Reference: 55 Sheldon Avenue
Survey Reference: Be Clean Assessment

Issued on Date: 26.Jan.2016
Prop Type Ref:

Property: 55, Sheldon Avenue, LONDON, N6 4NH

SAP Rating: 87 B **CO2 Emissions (t/year):** 11.24 **DER:** 12.82 Pass **TER:** 13.00 **Percentage DER<TER:** 1.36 %
Environmental: 84 B **General Requirements Compliance:** Pass **DFEE:** 59.75 Pass **TFEE:** 61.20 **Percentage DFEE<TFEE:** 2.36 %

CfSH Results **Version:** November 2010 - June 2014 Addendum **ENE1 Credits:** 0.2 **ENE2 Credits:** 3.0 **ENE7 Credits:** 0 **CfSH Level:** 3

Surveyor: Luke Brehaut, Tel: 01489861481 Surveyor ID: E854-0002
Address: Solent Business Park, Whiteley, Fareham, Hampshire, PO15 7AH
Client:

Software Version: Elmhurst Energy Systems SAP2012 Calculator (Design System) version 3.03r13
SAP version: SAP 2012, Regs Region: England (Part L1A 2013), Calculation Type: New Build (As Designed)

SUMMARY FOR INPUT DATA FOR New Build (As Designed)

Orientation	East
1.0 Property Type	House, Detached
2.0 Number of Storeys	4
3.0 Date Built	2016
3.0 Property Age Band	
4.0 Sheltered Sides	3
5.0 Sunlight/Shade	Average or unknown

6.0 Measurements

	Heat Loss Perimeter	Internal Floor Area	Average Storey Height
Basement:	111.29	380.66	3.24
1st Storey:	70.82	277.36	4.10
2nd Storey:	63.20	210.49	3.30
3rd Storey:	45.75	130.14	2.75

7.0 Living Area	111.30
8.0 Thermal Mass Parameter	Simple calculation - Medium

9.0 External Walls

Description	Construction	U-Value	Kappa	Gross Area	Nett Area
Basement External Wall	Cavity wall; plasterboard on dabs or battens, lightweight aggregate block, filled cavity, any outside structure	0.15		360.58	360.58
External Wall	Cavity wall; plasterboard on dabs or battens, lightweight aggregate block, filled cavity, any outside structure	0.15		537.81	380.74

10.0 External Roofs

Description	Construction	U-Value	Kappa	Gross Area	Nett Area
Basement Flat Roof	Plasterboard, insulated flat roof	0.16		125.22	119.62
Ground Floor Flat Roof	Plasterboard, insulated flat roof	0.16		52.46	43.95
First Floor Flat Roof	Plasterboard, insulated flat roof	0.16		26.24	26.24
Second Floor Flat Roof	Plasterboard, insulated flat roof	0.16		64.35	59.13
Pitched Roof	Plasterboard, insulated slope	0.16		96.62	96.62

11.0 HeatLoss Floors

Description	Construction	U-Value	Kappa	Area
Basement Floor	Slab on ground, screed over insulation	0.15		349.28
Ground Floor	Slab on ground, screed over insulation	0.15		31.38

12.0 Opening Types

Description	Data Source	Type	Glazing	Glazing Gap	Argon Filled	Solar Trans	Frame Type	Frame Factor	U value
Windows	Manufacturer	Window	Double Low-E Soft 0.05			0.63		0.70	1.50
Roof Lights	Manufacturer	Roof Window	Double Low-E Soft 0.05			0.63		0.70	1.50
Front Door	Manufacturer	Solid Door							1.80

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13.0 Openings

Name	Opening Type	Location	Orientation	Curtain Type	Overhang Ratio	Wide Overhang	Width	Height	Count	Area	Curtain Closed
South Glazing	Window	[2] External Wall	South	None	0.00					32.13	
Rear Door	Solid Door	[2] External Wall	South							3.17	
East Glazing	Window	[2] External Wall	East	None	0.00					46.91	
Front Door	Solid Door	[2] External Wall	East							3.61	
North Glazing	Window	[2] External Wall	North	None	0.00					13.66	
West Glazing	Window	[2] External Wall	West	None	0.00					57.59	
Basement Rooflight	Roof Window	[1] Basement Flat Roof	Horizontal	None						5.60	
Ground Rooflight	Roof Window	[2] Ground Floor Flat Roof	Horizontal	None						8.51	
Second Flr Rooflight	Roof Window	[4] Second Floor Flat Roof	Horizontal	None						5.22	

14.0 Conservatory None
15.0 Draught Proofing 100
16.0 Draught Lobby No

17.0 Thermal Bridging Calculate Bridges
17.1 List of Bridges

Source Type	Bridge Type	Length	Psi	Imported
Table K1 - Default	E1 Steel lintel with perforated steel base plate	67.52	1.000	Yes
Table K1 - Default	E3 Sill	64.87	0.080	Yes
Table K1 - Default	E4 Jamb	236.16	0.100	Yes
Table K1 - Default	E5 Ground floor (normal)	111.29	0.320	Yes
Table K1 - Default	E6 Intermediate floor within a dwelling	179.77	0.140	Yes
Table K1 - Default	E16 Corner (normal)	53.56	0.180	Yes
Table K1 - Default	R1 Head of roof window	4.97	0.080	Yes
Table K1 - Default	R2 Sill of roof window	4.97	0.060	Yes
Table K1 - Default	R3 Jamb of roof window	23.62	0.080	Yes

18.0 Pressure Testing Yes
Designed q50 3.00
Property Tested ?
As Built q50
Same As Designed ?

19.0 Mechanical Ventilation
Mechanical Ventilation System Present Yes
Approved Installation Yes
Windows open in hot weather Windows half open
Cross ventilation possible Yes
Night Ventilation Yes
Air change rate 4.00
Mechanical Ventilation data Type Database
Type Balanced mechanical ventilation with heat recovery
MV Reference Number 500362
Configuration 4
MVHR Duct Insulated Yes
Manufacturer SFP 0.79
Duct Type Rigid
MVHR Efficiency 87.00
Wet Rooms 4
Brand, Model

20.0 Fans, Open Fireplaces, Flues

	MHS	SHS	Other	Total
Number of Chimneys	0		0	0
Number of open flues	0		0	0
Number of intermittent fans				0
Number of passive vents				0
Number of flueless gas fires				0

21.0 Cooling System No

22.0 Lighting
Internal
Total number of light fittings 100
Total number of L.E.L. fittings 100
Percentage of L.E.L. fittings 100.00
External
External lights fitted Yes

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Light and motion sensors	Yes
23.0 Electricity Tariff	Standard
24.0 Heating Systems	
Main Heating 1	Manufacturer
Description	Gas Fired Boiler
Percentage of Heat	100 %
Main Heating 2	None
Description	
Percentage of Heat	%
Community Heating	
Secondary Heating	None
Water Heating	Main Heating 1
Flue Gas Heat Recovery System	No
Waste Water Heat Recovery	No
Instantaneous System 1	
Waste Water Heat Recovery	No
Instantaneous System 2	
Waste Water Heat Recovery Storage System	No
Solar Panel	No
25.0 Main Heating 1	
Database Ref. No.	
Fuel Type	
Main Heating	BGD
TestMethod	
SAP Code	106
Efficiency (Sedbuk 2009) %	94.0
Efficiency (Sedbuk 2009) %	
In Winter	
In Summer	
Model Name	Thision
Manufacturer	MHS
Controls	CBI Time and temperature zone control
PCDF Controls	0
Delayed Start Stat	Yes
Sap Code	2110
Burner Control	Modulating
Boiler Compensator	
HETAS approved System	
Oil Pump Inside	
FI Case	
FI Water	
Flue Type	Balanced
Smoke Control Area	
Fan Assisted Flue	Yes
Is MHS Pumped	Pump in heated space
Heat Emitter	Radiators
Underfloor Heating	
Flow Temperature	
Electric CPSU Temperature	
Combi boiler type	
Combi keep hot type	
Combi store type	
27.0 Community Heating	
Space Community Heating	
PCDF Index	
Distribution Loss	
Distribution Loss Value	
Controls	
SAP Code	
Water Community Heating	
PCDF Index	
Distribution Loss	
Distribution Loss Value	
Charging Linked To Heat Use	
28.0 Secondary Heating	
Description	
SHS efficiency %	
SAP Code	
HETAS Approved System	
Smoke Control Area	
Test Method	
Manufacturer	
Model Name	
29.0 Water Heating	HWP From main heating 1
Water use <= 125 litres/person/day	Yes

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SAP Code	901
Immersion Heater	
Summer Immersion	
Suplementary Immersion	
Immersion Only Heating Hot Water	
29.1 Flue Gas Heat Recovery System	
Database ID	
Brand Model	
Details	
29.2 Waste Water Heat Recovery System	
Total rooms with shower and/or bath	
30.0 Hot Water Cylinder	Hot Water Cylinder
Cylinder Stat	Yes
Cylinder In Heated Space	Yes
Independent Time Control	Yes
Insulation Type	Foam
Insulation Thickness	
Cylinder Volume	600.00
Loss (kwh/day)	
Pipes insulation	Fully insulated primary pipework
In Airing Cupboard	
31.0 Solar Panel	
Solar Panel Area	
Area Type	
Panel Type	
n0, a1, a2, A/G ratio	
Orientation	
Elevation	
Overshading	
Solar Storage Volume	
Pump electrically powered	
Combined Cylinder	
32.0 Thermal Store	None
Thermal Store Pipework	
33.0 Photovoltaic Unit	
Apportioned KWh/Year	
34.0 Wind Turbines	
Terrain Type	Urban
Wind Turbines	
Count	
Apportioned Kwh/year	
Rotor Diameter	
Hub Height	
35.0 Small-scale Hydro	
Electricity Generated	
Description	
Apportioned kWh/Year	

Recommendations

None

Further measures to achieve even higher standards

None

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SAP Calculations

Client:

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Cooper Homewood Limited
lbrehaut@cooperhomewood.com

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1600 Parkway
Solent Business Park
Whiteley
PO15 7AH

Property Reference: 55 Sheldon Avenue
Survey Reference: ASHP & PV (01.02.16)

Issued on Date: 01.Feb.2016
Prop Type Ref:

Property: 55, Sheldon Avenue, LONDON, N6 4NH

SAP Rating:	84 B	**CO2 Emissions (t/year):**	10.63	**DER:**	12.14 Pass	**TER:**	19.70	**Percentage DER<TER:**	38.38 %
Environmental:	85 B	**General Requirements Compliance:**	Pass	**DFEE:**	59.75 Pass	**TFEE:**	61.20	**Percentage DFEE<TFEE:**	2.36 %

CfSH Results **Version:** November 2010 - June 2014 Addendum **ENE1 Credits:** 4.5 **ENE2 Credits:** 3.0 **ENE7 Credits:** 1 **CfSH Level:** 4

Surveyor: Luke Brehaut, Tel: 01489861481 Surveyor ID: E854-0002
Address: Solent Business Park, Whiteley, Fareham, Hampshire, PO15 7AH
Client:

Software Version: Elmhurst Energy Systems SAP2012 Calculator (Design System) version 3.03r13
SAP version: SAP 2012, Regs Region: England (Part L1A 2013), Calculation Type: New Build (As Designed)

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Total floor area	998.65 m2
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CO2 emissions offset from additional allowable electricity generation	0.00 kgCO2/yr/m2 (ZC7)
Residual CO2 emissions offset from biofuel CHP	0.00 kgCO2/yr/m2 (ZC5)
Total CO2 emissions offset from SAP Section 16 allowances	0.00 kgCO2/yr/m2
DER accounting for SAP Section 16 allowances	12.14 kgCO2/yr/m2
% reduction DER/TER	38.38 %
CfSH ENE1 credits achieved	4.5
CfSH ENE1 level achieved	4

ENE 2 calculation

Dwelling type	House, Detached
Fabric energy efficiency (F.E.E.)	59.75
CfSH ENE2 credits achieved	3.0
CfSH ENE1 and 2 overall level achieved	4

ENE 7 calculation

Standard case CO2 emissions

Total floor area	998.65 m2	
DER	14.11 kgCO2/yr/m2	
CO2 emissions from electrical appliances	5.40 kgCO2/yr/m2	(ZC2)
CO2 emissions from cooking	0.22 kgCO2/yr/m2	(ZC3)
Standard case total CO2 emissions	19.73 kgCO2/yr/m2	(ZC4)
Net Standard case CO2 emissions	19.73 kgCO2/yr/m2	(ZC8)

Actual case CO2 emissions

DER	12.05 kgCO2/yr/m2	
CO2 emissions from electrical appliances	5.40 kgCO2/yr/m2	(ZC2)
CO2 emissions from cooking	0.22 kgCO2/yr/m2	(ZC3)
Actual case total CO2 emissions	17.67 kgCO2/yr/m2	(ZC4)
CO2 emissions from Biomass	0.00 kgCO2/yr/m2	(ZC5)
CO2 reduction from additional allowable electricity generation	0.00 kgCO2/yr/m2	(ZC7)
Net Actual case CO2 emissions	17.67 kgCO2/yr/m2	(ZC8)
% improvement in net actual/net standard case CO2 emissions	10 %	
ENE7 credits achieved	1	

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COOPERHOMEWOOD
ENGINEERING CONSULTANCY

Building Regulation Compliance

Property Reference: 55 Sheldon Avenue
Survey Reference: ASHP & PV (01.02.16)
Property: 55, Sheldon Avenue, LONDON, N6 4NH

Issued on Date: 01.Feb.2016
Prop Type Ref:

SAP Rating: 84 B **CO2 Emissions (t/year):** 10.63 **DER:** 12.14 Pass **TER:** 19.70 **Percentage DER<TER:** 38.38 %
Environmental: 85 B **General Requirements Compliance:** Pass **DFEE:** 59.75 Pass **TFEE:** 61.20 **Percentage DFEE<TFEE:** 2.36 %

CfSH Results **Version:** November 2010 - June 2014 Addendum **ENE1 Credits:** 4.5 **ENE2 Credits:** 3.0 **ENE7 Credits:** 1 **CfSH Level:** 4

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Client:

Software Version: Elmhurst Energy Systems SAP2012 Calculator (Design System) version 3.03r13
SAP version: SAP 2012, Regs Region: England (Part L1A 2013), Calculation Type: New Build (As Designed)

SUMMARY FOR INPUT DATA FOR New Build (As Designed)

1a TER and DER

Fuel for main heating:	Electricity	
Fuel factor:	1.55 (electricity)	
Target Carbon Dioxide Emission Rate (TER)	19.70 kg/m^2	
Dwelling Carbon Dioxide Emission Rate (DER)	12.14 kg/m^2	OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)	61.20 kWh/m^2	
Dwelling Fabric Energy Efficiency (DFEE)	59.75 kWh/m^2	OK

2 Fabric U-values

Element	Average	Highest	
External wall	0.15 (max. 0.30)	0.15 (max. 0.70)	OK
Floor	0.15 (max. 0.25)	0.15 (max. 0.70)	OK
Roof	0.16 (max. 0.20)	0.16 (max. 0.35)	OK
Openings	1.51 (max. 2.00)	1.80 (max. 3.30)	OK

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

Air permeability at 50 pascals:	3.00 (design value)	
Maximum	10.0	OK

4 Heating efficiency

Main heating system:	Heat pump with radiators or underfloor - Electric Air-to-water heat pump	
Secondary heating system:	None	

5 Cylinder insulation

Hot water storage	Nominal cylinder loss: 4.05 kWh/day Permitted by DBSCG 4.40	OK
Primary pipework insulated:	Yes	OK

6 Controls

Space heating controls:	Time and temperature zone control	OK
Hot water controls:	Cylinderstat	OK
	Independent timer for DHW	OK

7 Low energy lights

Percentage of fixed lights with low-energy fittings:	100%	
Minimum	75%	OK

8 Mechanical ventilation

Continuous supply and extract system		
Specific fan power:	0.78	
Maximum	1.5	OK

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MVHR efficiency:	86%	
Minimum:	70%	OK

9 Summertime temperature

Overheating risk (Thames Valley):	Not significant	OK
Based On:		
Overshading:	Average	
Windows facing North:	13.66 m^2, No overhang	
Windows facing East:	46.91 m^2, No overhang	
Windows facing South:	32.13 m^2, No overhang	
Windows facing West:	57.59 m^2, No overhang	
Air change rate:	4.00 ach	
Blinds/curtains:	None	

10 Key features

Air permeability	3.0 m^3/m^2h
Photovoltaic array	

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Predicted Energy Assessment

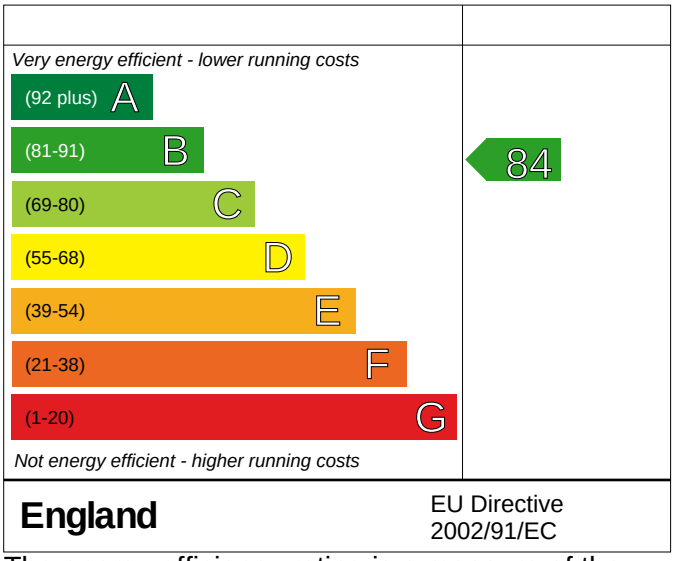
55, Sheldon Avenue,
LONDON,
N6 4NH

Dwelling type:	House, Detached
Date of assessment:	01.Feb.2016
Produced by:	Cooper Homewood Limited
Total floor area:	998.65 m^2

This document is a Predicted Energy Assessment for properties marketed when they are incomplete. It includes a predicted energy rating which might not represent the final energy rating of the property on completion. Once the property is completed, this rating will be updated and an official Energy Performance Certificate will be created for the property. This will include more detailed information about the energy performance of the completed property.

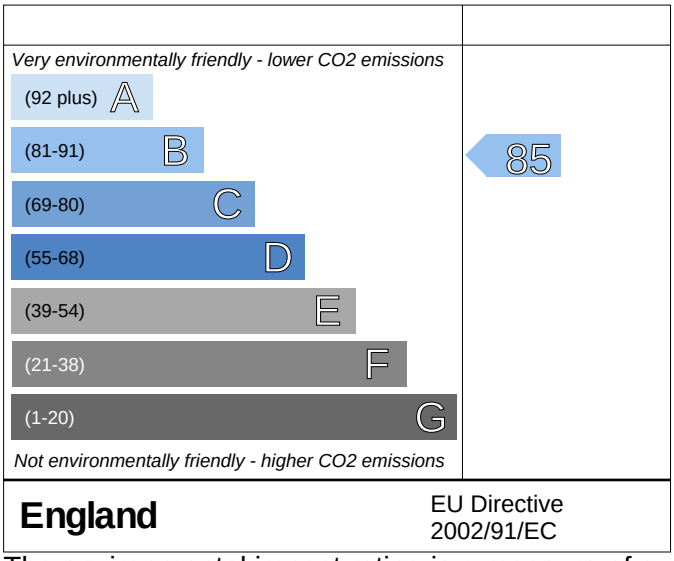
The energy performance has been assessed using the Government approved SAP2012 methodology and is rated in terms of the energy use per square meter of floor area; the energy efficiency is based on fuel costs and the environmental impact is based on carbon dioxide (CO2) emissions.

Energy Efficiency Rating



The energy efficiency rating is a measure of the overall efficiency of a home. The higher the rating the more energy efficient the home is and the lower the fuel bills are likely to be.

Environmental Impact (CO2) Rating



The environmental impact rating is a measure of a home's impact on the environment in terms of carbon dioxide (CO2) emissions. The higher the rating the less impact it has on the environment.

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Cooper Homewood Ltd
1600 Parkway
Solent Business Park
Whiteley
PO15 7AH

COOPERHOMEWOOD
ENGINEERING CONSULTANCY

Summary Information

Property Reference: 55 Sheldon Avenue
Survey Reference: ASHP & PV (01.02.16)

Issued on Date: 01.Feb.2016
Prop Type Ref:

Property: 55, Sheldon Avenue, LONDON, N6 4NH

SAP Rating: 84 B **CO2 Emissions (t/year):** 10.63 **DER:** 12.14 Pass **TER:** 19.70 **Percentage DER<TER:** 38.38 %
Environmental: 85 B **General Requirements Compliance:** Pass **DFEE:** 59.75 Pass **TFEE:** 61.20 **Percentage DFEE<TFEE:** 2.36 %

CfSH Results **Version:** November 2010 - June 2014 Addendum **ENE1 Credits:** 4.5 **ENE2 Credits:** 3.0 **ENE7 Credits:** 1 **CfSH Level:** 4

Surveyor: Luke Brehaut, Tel: 01489861481 Surveyor ID: E854-0002
Address: Solent Business Park, Whiteley, Fareham, Hampshire, PO15 7AH
Client:

Software Version: Elmhurst Energy Systems SAP2012 Calculator (Design System) version 3.03r13
SAP version: SAP 2012, Regs Region: England (Part L1A 2013), Calculation Type: New Build (As Designed)

SUMMARY FOR INPUT DATA FOR New Build (As Designed)

Orientation	East
1.0 Property Type	House, Detached
2.0 Number of Storeys	4
3.0 Date Built	2016
3.0 Property Age Band	
4.0 Sheltered Sides	3
5.0 Sunlight/Shade	Average or unknown

6.0 Measurements

	Heat Loss Perimeter	Internal Floor Area	Average Storey Height
Basement:	111.29	380.66	3.24
1st Storey:	70.82	277.36	4.10
2nd Storey:	63.20	210.49	3.30
3rd Storey:	45.75	130.14	2.75

7.0 Living Area	111.30
8.0 Thermal Mass Parameter	Simple calculation - Medium

9.0 External Walls

Description	Construction	U-Value	Kappa	Gross Area	Nett Area
Basement External Wall	Cavity wall; plasterboard on dabs or battens, lightweight aggregate block, filled cavity, any outside structure	0.15		360.58	360.58
External Wall	Cavity wall; plasterboard on dabs or battens, lightweight aggregate block, filled cavity, any outside structure	0.15		537.81	380.74

10.0 External Roofs

Description	Construction	U-Value	Kappa	Gross Area	Nett Area
Basement Flat Roof	Plasterboard, insulated flat roof	0.16		125.22	119.62
Ground Floor Flat Roof	Plasterboard, insulated flat roof	0.16		52.46	43.95
First Floor Flat Roof	Plasterboard, insulated flat roof	0.16		26.24	26.24
Second Floor Flat Roof	Plasterboard, insulated flat roof	0.16		64.35	59.13
Pitched Roof	Plasterboard, insulated slope	0.16		96.62	96.62

11.0 HeatLoss Floors

Description	Construction	U-Value	Kappa	Area
Basement Floor	Slab on ground, screed over insulation	0.15		349.28
Ground Floor	Slab on ground, screed over insulation	0.15		31.38

12.0 Opening Types

Description	Data Source	Type	Glazing	Glazing Gap	Argon Filled	Solar Trans	Frame Type	Frame Factor	U value
Windows	Manufacturer	Window	Double Low-E Soft 0.05			0.63		0.70	1.50
Roof Lights	Manufacturer	Roof Window	Double Low-E Soft 0.05			0.63		0.70	1.50
Front Door	Manufacturer	Solid Door							1.80

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13.0 Openings

Name	Opening Type	Location	Orientation	Curtain Type	Overhang Ratio	Wide Overhang	Width	Height	Count	Area	Curtain Closed
South Glazing	Window	[2] External Wall	South	None	0.00					32.13	
Rear Door	Solid Door	[2] External Wall	South							3.17	
East Glazing	Window	[2] External Wall	East	None	0.00					46.91	
Front Door	Solid Door	[2] External Wall	East							3.61	
North Glazing	Window	[2] External Wall	North	None	0.00					13.66	
West Glazing	Window	[2] External Wall	West	None	0.00					57.59	
Basement Rooflight	Roof Window	[1] Basement Flat Roof	Horizontal	None						5.60	
Ground Rooflight	Roof Window	[2] Ground Floor Flat Roof	Horizontal	None						8.51	
Second Flr Rooflight	Roof Window	[4] Second Floor Flat Roof	Horizontal	None						5.22	

14.0 Conservatory None
15.0 Draught Proofing 100
16.0 Draught Lobby No

17.0 Thermal Bridging Calculate Bridges

17.1 List of Bridges

Source Type	Bridge Type	Length	Psi	Imported
Table K1 - Default	E1 Steel lintel with perforated steel base plate	67.52	1.000	Yes
Table K1 - Default	E3 Sill	64.87	0.080	Yes
Table K1 - Default	E4 Jamb	236.16	0.100	Yes
Table K1 - Default	E5 Ground floor (normal)	111.29	0.320	Yes
Table K1 - Default	E6 Intermediate floor within a dwelling	179.77	0.140	Yes
Table K1 - Default	E16 Corner (normal)	53.56	0.180	Yes
Table K1 - Default	R1 Head of roof window	4.97	0.080	Yes
Table K1 - Default	R2 Sill of roof window	4.97	0.060	Yes
Table K1 - Default	R3 Jamb of roof window	23.62	0.080	Yes

18.0 Pressure Testing Yes
Designed q50 3.00
Property Tested ?
As Built q50
Same As Designed ?

19.0 Mechanical Ventilation
Mechanical Ventilation System Present Yes
Approved Installation Yes
Windows open in hot weather Windows half open
Cross ventilation possible Yes
Night Ventilation Yes
Air change rate 4.00
Mechanical Ventilation data Type Database
Type Balanced mechanical ventilation with heat recovery
MV Reference Number 500361
Configuration 4
MVHR Duct Insulated Yes
Manufacturer SFP 0.78
Duct Type Semi rigid
MVHR Efficiency 86.00
Wet Rooms 4
Brand, Model

20.0 Fans, Open Fireplaces, Flues

	MHS	SHS	Other	Total
Number of Chimneys	0		0	0
Number of open flues	0		0	0
Number of intermittent fans				0
Number of passive vents				0
Number of flueless gas fires				0

21.0 Cooling System Yes
Cooled Area 300.00
Data Source SAP table
Cooling Type Split or Multi-Split
Energy Class A
Energy Efficiency Ratio
System Control Modulating

22.0 Lighting

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Internal	
Total number of light fittings	100
Total number of L.E.L. fittings	100
Percentage of L.E.L. fittings	100.00
External	
External lights fitted	Yes
Light and motion sensors	Yes
23.0 Electricity Tariff	Standard
24.0 Heating Systems	
Main Heating 1	SAP table
Description	ASHP
Percentage of Heat	100 %
Main Heating 2	None
Description	
Percentage of Heat	%
Community Heating	
Secondary Heating	None
Water Heating	Main Heating 1
Flue Gas Heat Recovery System	No
Waste Water Heat Recovery	No
Instantaneous System 1	
Waste Water Heat Recovery	No
Instantaneous System 2	
Waste Water Heat Recovery Storage System	No
Solar Panel	No
25.0 Main Heating 1	
Database Ref. No.	
Fuel Type	
Main Heating	PEQ
TestMethod	
SAP Code	214
Efficiency (SAP Table) %	249.9
Efficiency (SAP Table) %	
In Winter	
In Summer	
Model Name	
Manufacturer	
Controls	CHD Time and temperature zone control
PCDF Controls	0
Delayed Start Stat	
Sap Code	2207
Burner Control	
Boiler Compensator	
HETAS approved System	
Oil Pump Inside	
FI Case	
FI Water	
Flue Type	
Smoke Control Area	
Fan Assisted Flue	
Is MHS Pumped	Pump in heated space
Heat Emitter	Underfloor
Underfloor Heating	Yes - Pipes in thin screed
Flow Temperature	Yes - Pipes in thin screed
Electric CPSU Temperature	
Combi boiler type	
Combi keep hot type	
Combi store type	
27.0 Community Heating	
Space Community Heating	
PCDF Index	
Distribution Loss	
Distribution Loss Value	
Controls	
SAP Code	
Water Community Heating	
PCDF Index	
Distribution Loss	
Distribution Loss Value	
Charging Linked To Heat Use	
28.0 Secondary Heating	
Description	
SHS efficiency %	
SAP Code	
HETAS Approved System	

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Smoke Control Area	
Test Method	
Manufacturer	
Model Name	
29.0 Water Heating	HWP From main heating 1
Water use <= 125 litres/person/day	Yes
SAP Code	901
Immersion Heater	
Summer Immersion	
Suplementary Immersion	No
Immersion Only Heating Hot Water	
29.1 Flue Gas Heat Recovery System	
Database ID	
Brand Model	
Details	
29.2 Waste Water Heat Recovery System	
Total rooms with shower and/or bath	
30.0 Hot Water Cylinder	Hot Water Cylinder
Cylinder Stat	Yes
Cylinder In Heated Space	Yes
Independent Time Control	Yes
Insulation Type	Foam
Insulation Thickness	
Cylinder Volume	600.00
Loss (kwh/day)	
Pipes insulation	Fully insulated primary pipework
In Airing Cupboard	
31.0 Solar Panel	
Solar Panel Area	
Area Type	
Panel Type	
n0, a1, a2, A/G ratio	
Orientation	
Elevation	
Overshading	
Solar Storage Volume	
Pump electrically powered	
Combined Cylinder	
32.0 Thermal Store	None
Thermal Store Pipework	
33.0 Photovoltaic Unit	One Dwelling
Apportioned KWh/Year	

PV Cells kW Peak	Orientation	Elevation	Overshading
1.31	South	Horizontal	None Or Little

34.0 Wind Turbines	
Terrain Type	Urban
Wind Turbines	
Count	
Apportioned Kwh/year	
Rotor Diameter	
Hub Height	
35.0 Small-scale Hydro	
Electricity Generated	
Description	
Apportioned kWh/Year	

Recommendations

None

Further measures to achieve even higher standards

None

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