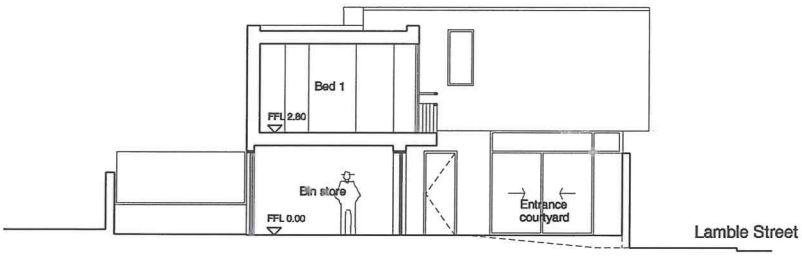
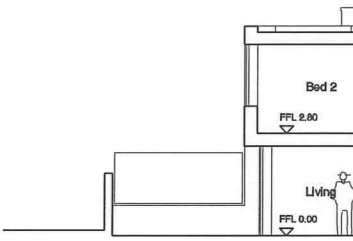
Appendix C
Design Team Strategies

C.1 Structural Strategy
C.2 Environmental Strategy
C.3 CSH Pre-Assessment Report

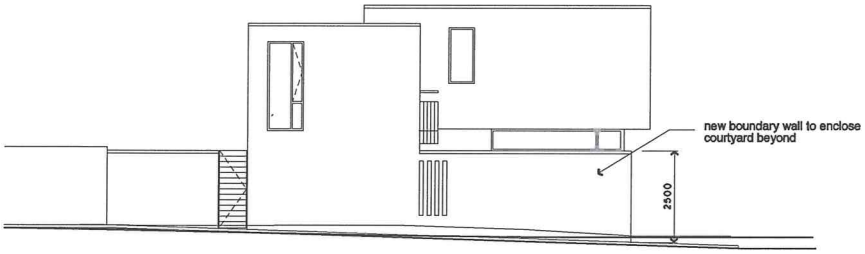
Appendix C.1 - Structural Strategy



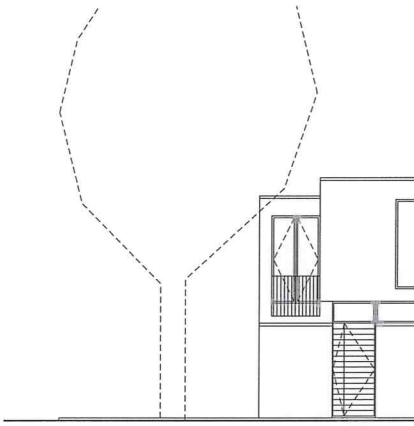
Section AA



Section BB

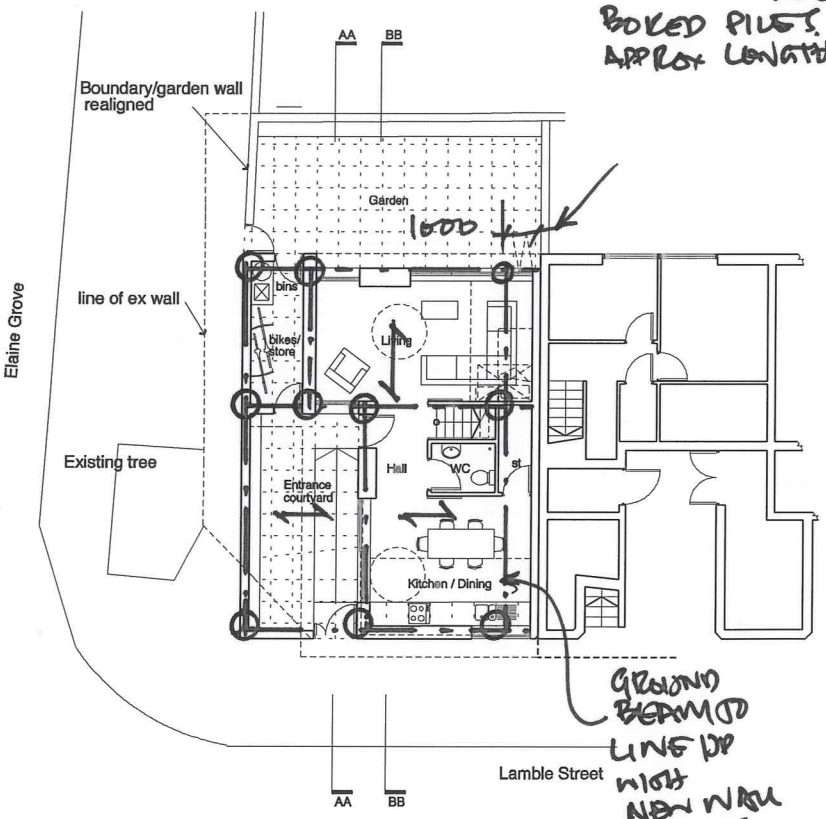


Elevation to Elaine Grove



Elevation to Lamb

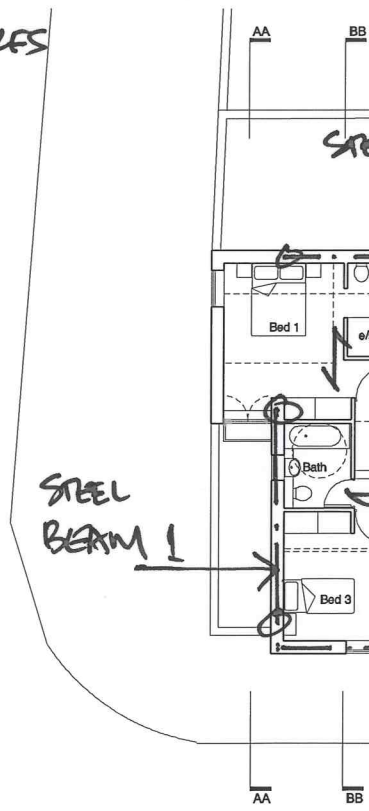
PILING - 300ϕ
BORED PILES.
APPROX LENGTH = 10 METRES



GROUND BEAM TO LINE UP WITH NEW WALL ABOVE

Ground Floor Plan

150 BEAM AND BLOCK FLOOR.
500 x 500 RC GROUND BEAMS



STEEL BEAM 1

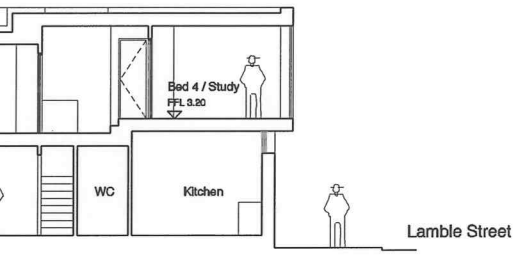
First Floor Plan

228x

STEEL BEAMS

Accommodation:

1no 4B 6P family house with garden
Gross internal area, inc bin store
= 121m2



EXTERNAL WALLS

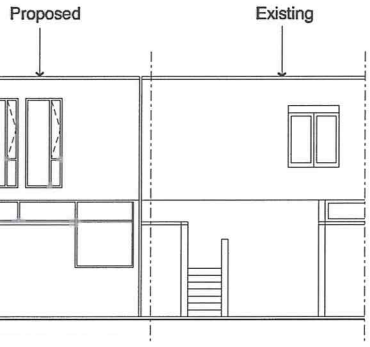
SINGLE SKIN BRICKWORK + 140x50 STUDS AT 600 c/c.

LINTELS

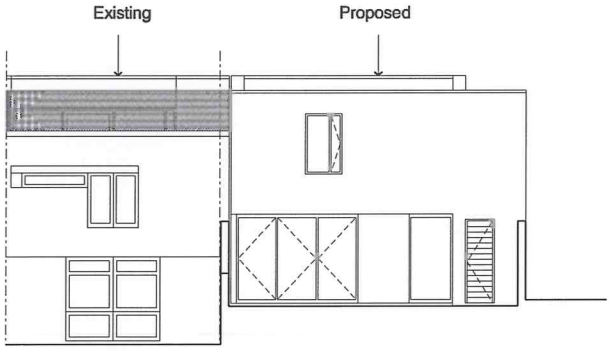
IG - EXTERNAL

TRIPLE JOIST INTERNAL SKIN

AMENDED UP TO SHOW THE STRUCTURE 17th OCTOBER 2013



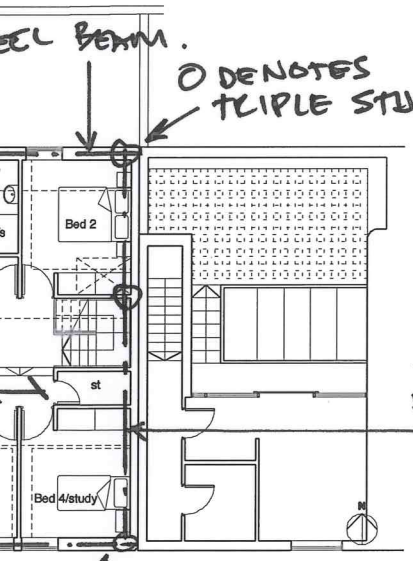
le Street



Elevation to Garden

EEL BEAM.

O DENOTES TRIPLE STUDS

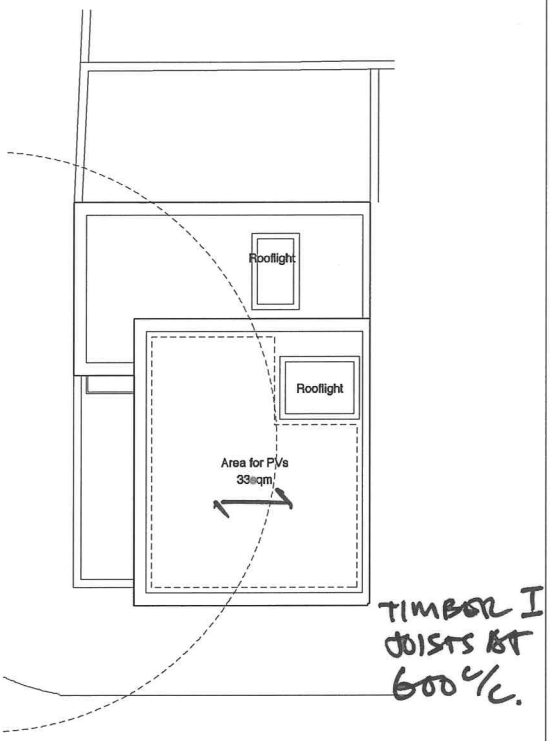


STEEL BEAM 2

STEEL BEAM 3.

50 JOISTS AT 400 c/c.

203x203x 46 UC's



TIMBER I JOISTS AT 600 c/c.

Roof Plan

JOB 14154

C	27/09/13	TS	
Scheme developed for consultants input			
B	16/09/13	TS	
Scheme revised following comments			
A	03/09/13	TS	
Scheme revised following comments			
Revision	Date	By	Checked

Preliminary

Site 1 - Corner Lamble St
Proposed Plans, Sections & Elevations

Barrington & Lamble Infill Sites

1381_P01_C

Scale: 1:100 at A1
1:200 at A3
Date: 02/07/123
Drawn: TS

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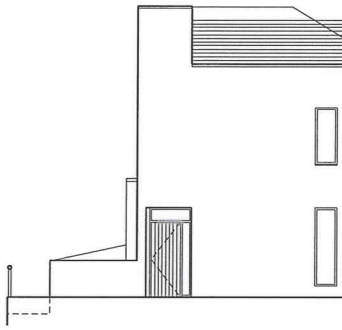
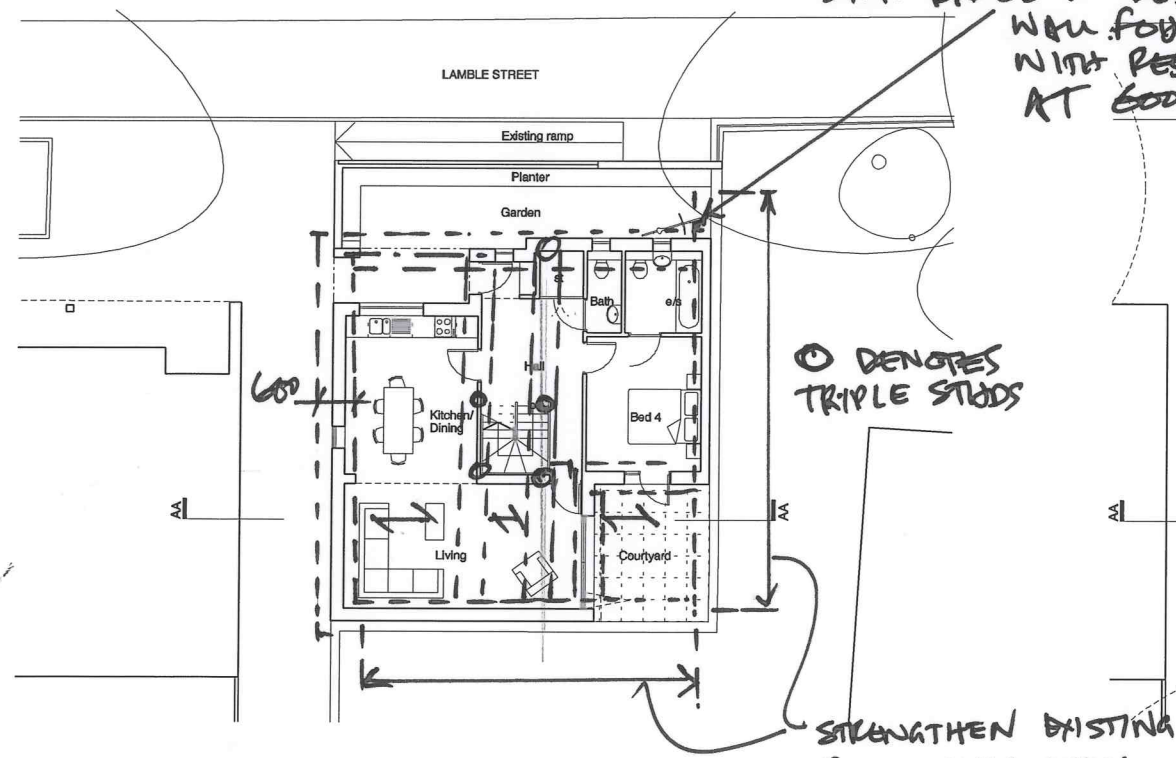
E studio@burdhaward.com

Elevation to Lamble Street



West Elevatio

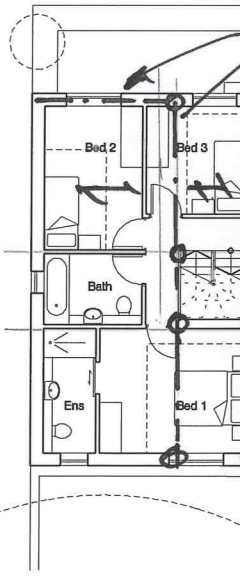
STRENGTHEN THE EXISTING FOUNDATIONS ADD 400x480 STRIP BONDED TO RETAINING WALL FOUNDATION WITH RESIN ANCHORS AT 600 c/c



O DENOTES TRIPLE STUDS

STRENGTHEN EXISTING RETAINING WALL USING DUCK BILL ANCHORS

Ground Floor Plan



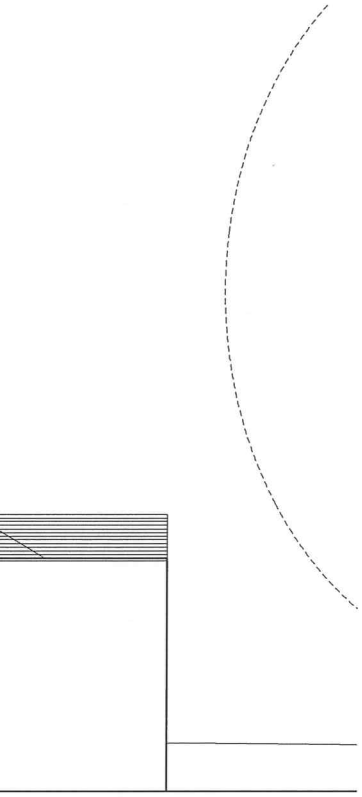
First Floor Pla

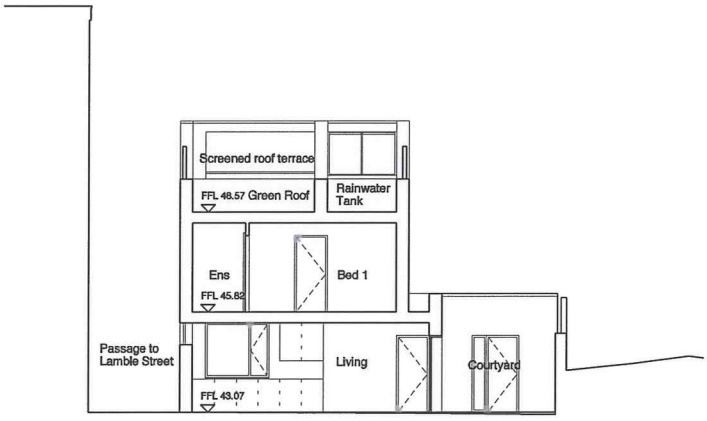
FOUNDATIONS 600 WIDE STRIP FOOTING PROVISION OF DEPTH 1.5 METRES

↔ 150 BEAM AND BLOCK FLOOR.

↔ 200

Accommodation:
1no 4B 6P two storey family house
Gross internal area
=138m2



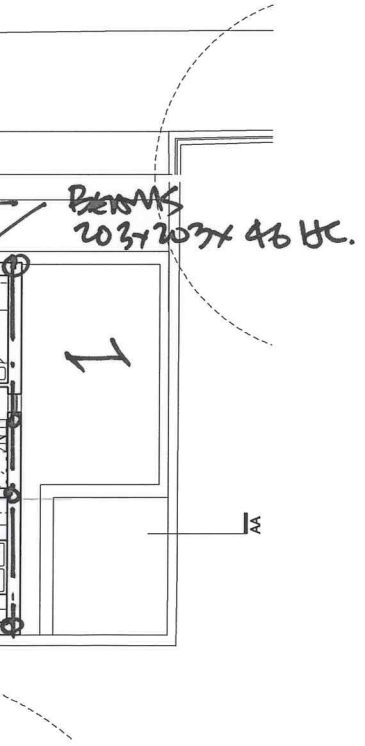


Section

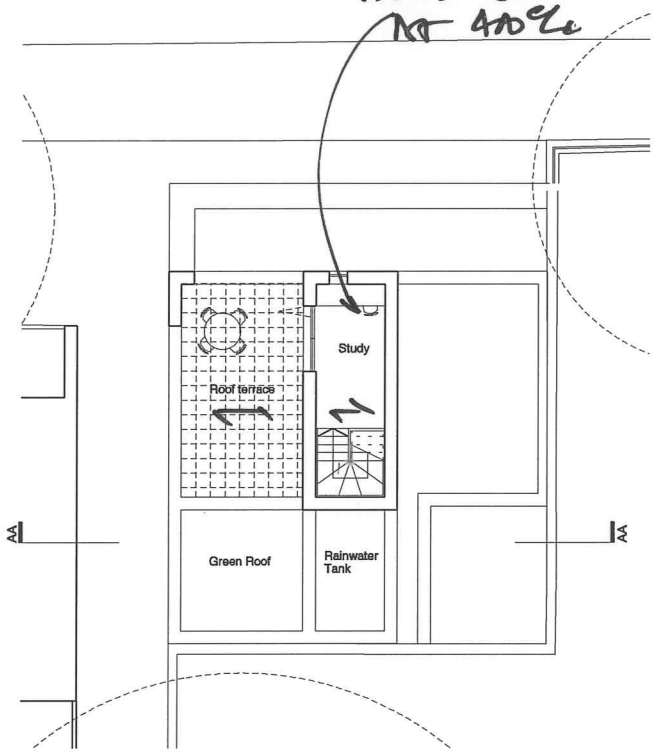
EXTERNAL WALLS
SINGLE SKIN
BRICKWORK +
140 x 50 STUDS
AT 600 c/c.
UNTOS EXTERNAL
LEAF -
STEEL - I G
INTERNAL SKIN.
TRIPLE JOISTS

STUDY ROOF
150x50 JOISTS
AT 400 c/c.

MOVED UP TO
SHOW STRUCTURE
17 OCTOBER 2013



BEAMS
203x203x46 UC.



Roof Plan

JOISTS 200x50@ 400 c/c.

x50 JOISTS @ 600 c/c.

Revision	Date	By	Checked
C Scheme developed for consultant input	27/09/13	TS	.
B Developed scheme design	17/09/13	TS	.
A Footprint revised - for costing	03/09/13	TS	.

Preliminary

Site 2 - Lamble Street Pram Sheds
Proposed Plans, Section

Barrington & Lamble Infill Sites

1381 / P02_B

Scale: 1:100 at A1
1:200 at A3
Date: 02/07/13
Drawn: TS

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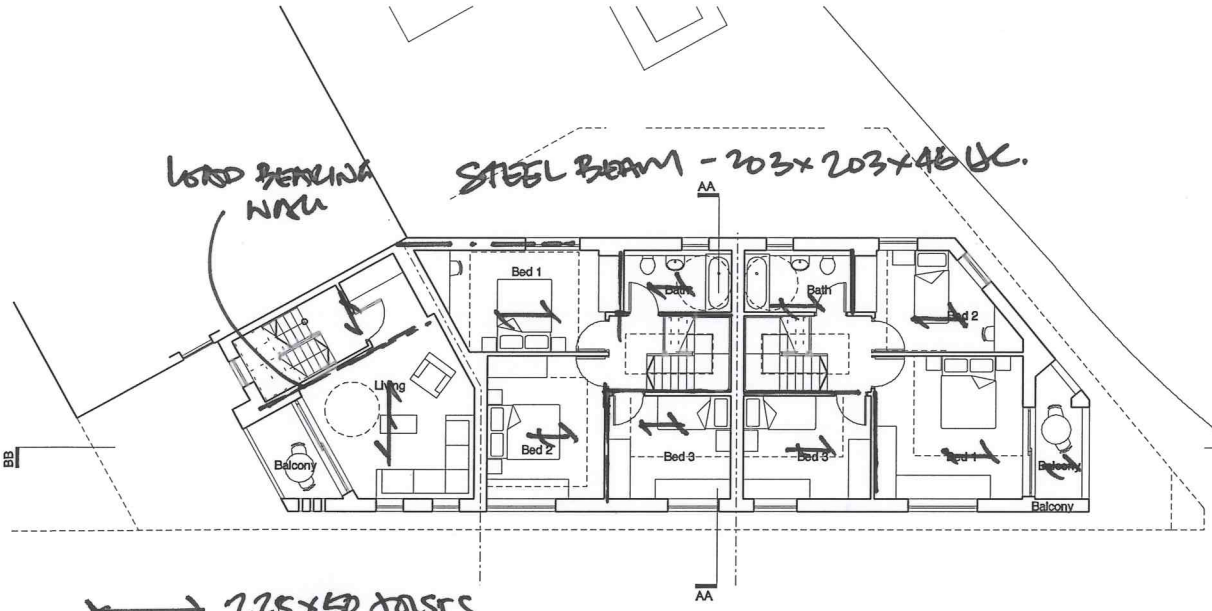
E studio@burdhaward.com

LOAD BEARING WALL

STEEL BEAM - 203 x 203 x 46 UC.



First Floor Plan

225 x 50 JOISTS @ 400 c/c

EXISTING BUILDING

X GF SLABS

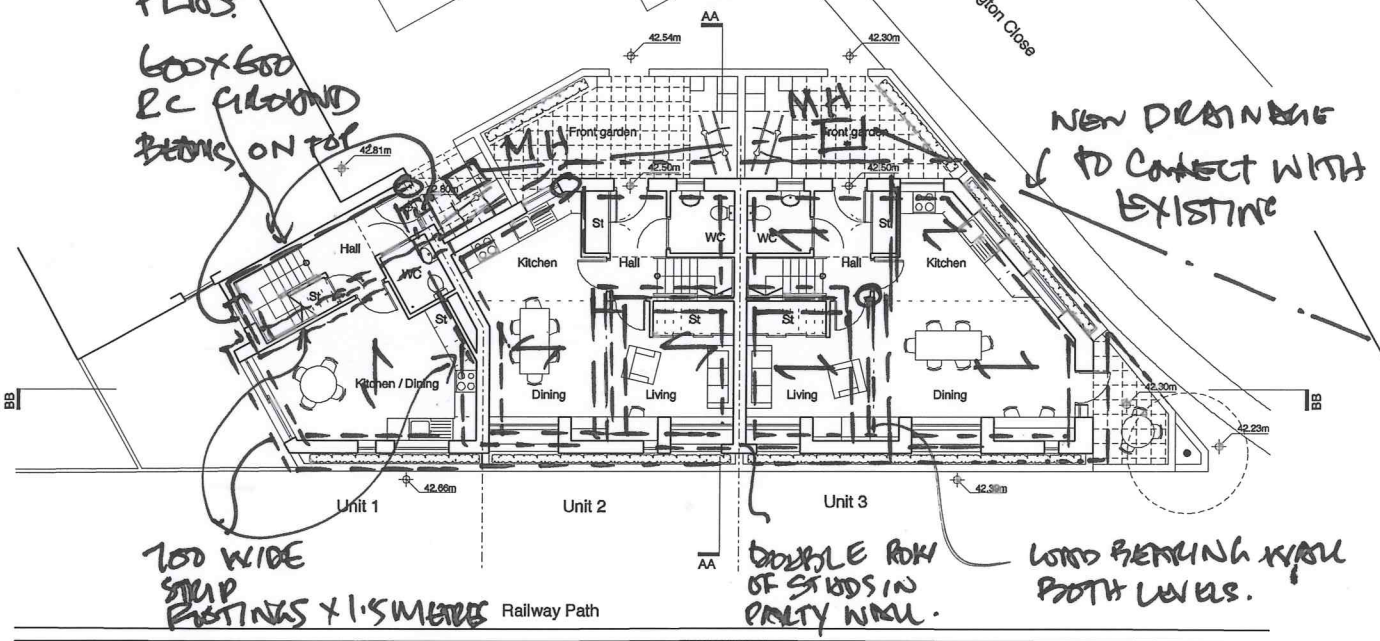
600 x 600 GROUND BEAM

O - DENOTES TRIPLE STUDS

STRIP FOUNDATION

STRIP FOUNDATIONS PLUS 600 x 600 RC GROUND BEAMS ON TOP

NEW DRAINAGE TO CONNECT WITH EXISTING



700 WIDE STRIP FOOTINGS x 1.5 METRES DEEP.

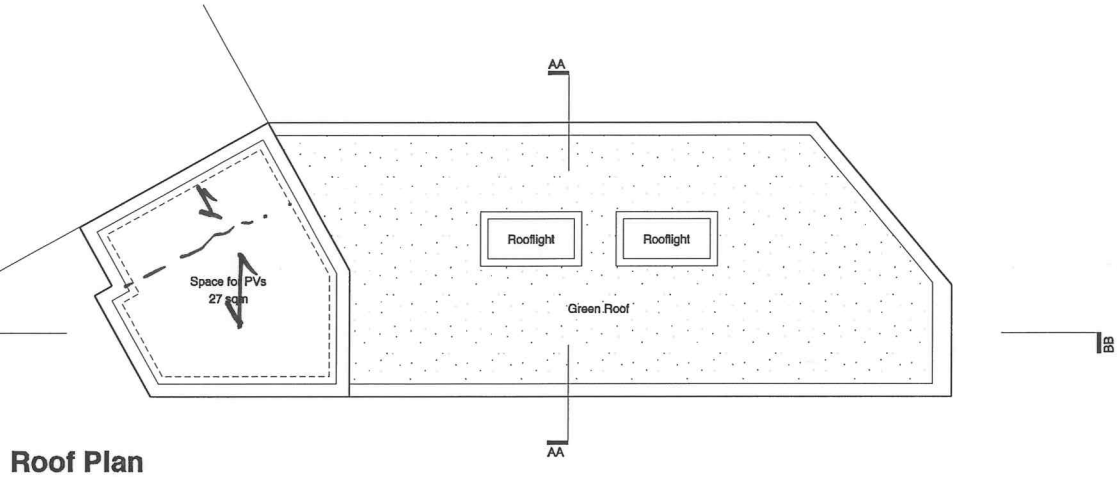
DOUBLE ROW OF STUDS IN PARTY WALL.

LOAD BEARING WALL BOTH LEVELS.

Ground Floor Plan

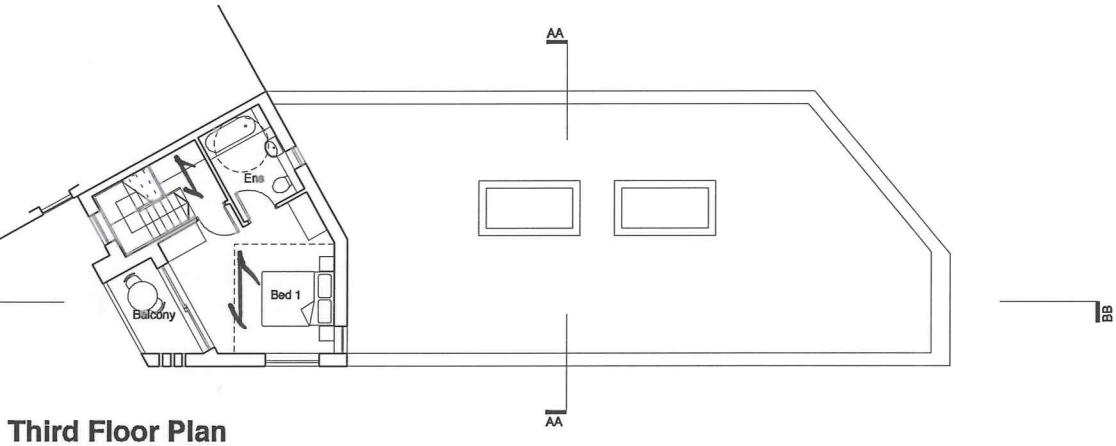
150 BEAM AND BLOCK FLOOR.

STRIP FOUNDATIONS 600 x 1000 AND 1.5 METRES DEEP LONG.



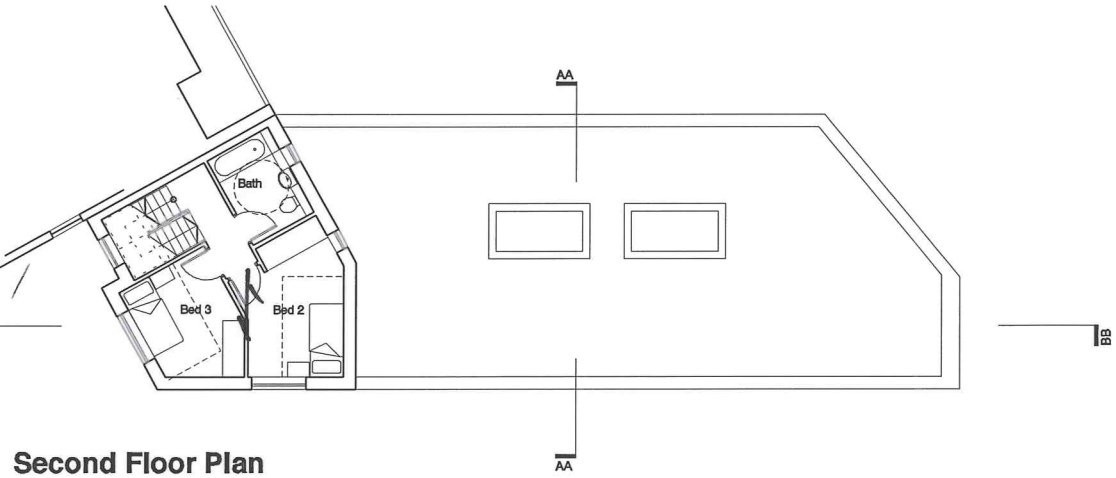
Roof Plan

(AS FIRST FLOOR)



Third Floor Plan

(AS FIRST FLOOR)



Second Floor Plan

(AS FIRST FLOOR)

Accommodation:

Unit 1
1no 3B 4P four storey house
Gross internal area
=119m2

Unit 2
1no 3B 5P two storey family house
Gross internal area
=92m2

Unit 3
1no 3B 4P two storey family house
Gross internal area
= 102m2

EXTERNAL WALLS
SINGLE SKIN
BRICKWORK +
140 STUDS AT 600%
LINTOLS EXTERNAL
STEEL - IG
INTERNAL SKIN
TRIPLE JOISTS
OVER OPENINGS.

MARKED UP TO
SHOW STRUCTURE
17th OCTOBER 2013

Revision	Date	By	Checked
C	27/09/13	TS	.
Scheme developed for consultant input; roof plan added			
B	17/09/13	TS	.
Developed scheme design			
A	03/09/13	TS	.
Revised Floor Plan for costing			

Preliminary

Site 3 - Barrington & Lamble
Boiler House
Proposed Plans

Barrington & Lamble Infill Sites

1381 / P03_C

Scale: 1:100 at A1
1:200 at A3
Date: 02/07/13
Drawn: TS

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Appendix C.2 - Environmental Strategy

Ingleton Wood

Billericay
Colchester
London
Norwich

www.ingletonwood.co.uk

Barrington and Lamble, Gospel Oak

ENERGY STRATEGY REPORT

Date 01.04.14

Revision A

architecture
building surveying
building services
urban planning
interior design
environmental design

Vision, form and function

Document Control

Revision	Stage	Date	Author	Checked by
1st Issue		31.03.14	LMT	RP
Rev A		01.04.14	LMT	RP

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Ingleton Wood LLP

Sustainability Engineers
Ingleton Wood LLP

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2.3 Site Analysis 6
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1.0 Executive Summary

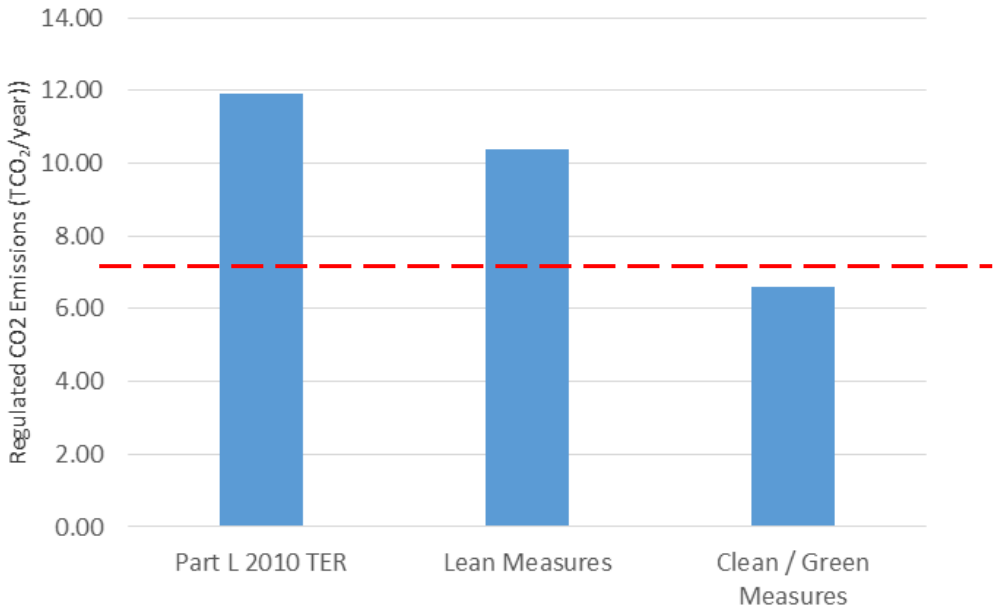
The proposed energy strategy for Barrington and Lamble (through appropriate use of the facade, efficient system design and the use of renewable energy systems) achieves the following savings in CO_2 emissions:

An overall **44.6%** reduction in regulated CO_2 emissions compared to the Part L 2010 TER, which consists of:

- A 12.8% reduction due to energy efficiency measures alone
- A 36.5% reduction due to the inclusion of renewable technologies

	Regulated CO_2 Emissions (T CO_2/year)	**Savings (TCO_2/year)**	**% Saving**
Part L 2010 TER	11.91	-	-
Lean Measures	10.38	1.53	12.8%
Clean / Green Measures	6.59	3.79	36.5%
Cumulative Savings		**5.32**	**44.6%**

Summary Table of Regulated CO_2 Emissions



Summary Graph of Regulated CO_2 Emissions

2.0 Introduction

2.1 Objective

This document has been produced by Ingleton Wood for Burd Haward Architects and London Borough of Camden to support the planning submission for the Gospel Oak Infill Sites known as "Barrington and Lamble".

2.2 Background

The client is London Borough of Camden and the project is the redevelopment of three infill sites in Gospel Oak, Camden. The three sites present different challenges.

Site 1 – Corner of Lamble Street – adjoins an existing terrace of 1980s 2-storey houses designed by Benson and Forsyth.

Site 2 – Lamble Street Pram Sheds – is located between the 10 storey Barrington Court and a 1960s terrace of 4 storey maisonettes.

Site 3 – Barrington Close Boiler House and Garages – is at the southern side of the Barrington and Lamble Estate adjacent to the railway path and the mainline to Euston.

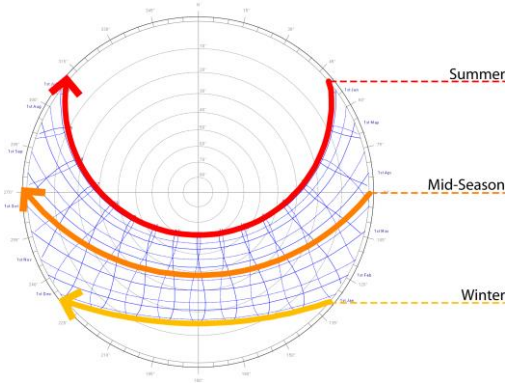
2.3 Microclimate

London has a temperate maritime climate which is characterised by a lack of extreme weather conditions with warm summers and cool winters. During the summer months, the average temperature reaches 19ºC with average maximum temperatures being up to 23ºC; during winter, average temperatures are approximately 6-8ºC. The effects of climate change and the urban heat island effect could cause increase in temperature in the coming years.

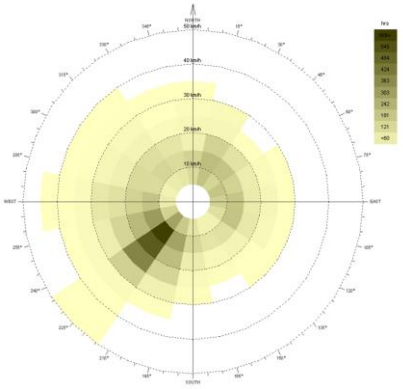
During the summer, the sun reaches a maximum altitude of 61.9° (rising in the NE and setting in the NW), while the maximum altitude in winter is only 15.0°. This is reflected in the variation of solar radiation throughout the year; the total annual global horizontal solar radiation is 951.5W/m^2, with a maximum monthly average of 145.5W/m^2 occurring in June of 145.5W/m^2 and a minimum monthly average of 15.2W/m^2 in December.

The annual precipitation for the area is approximately 550mm. It is predicted that annual rainfall levels will remain fairly constant, but will increase in winter and decrease in summer due to the effects of climate change.

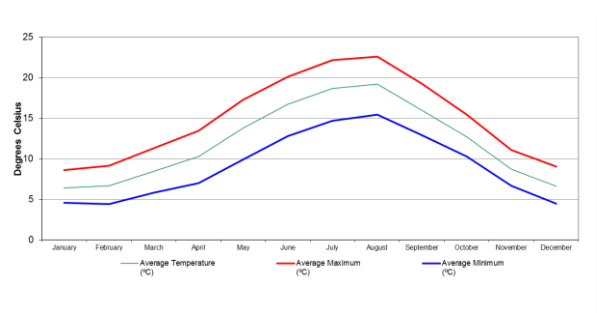
The average wind speed is 3.7m/s, coming predominantly from a south-westerly direction.



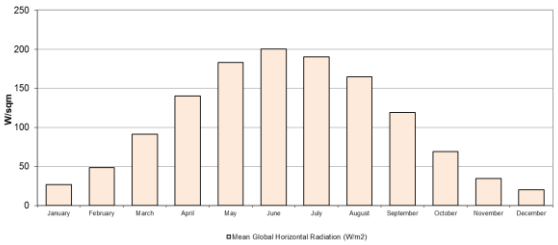
Annual sunpath



Annual wind rose



Average temperature (°C)



Average solar radiation (W/m^2)

2.3 Site Analysis

Site 1 is approximately 125m2 and bounded by a high rendered wall. The site has a large adjacent tree but otherwise good access to daylight with little shading from other buildings. Renewable potential probably focuses on solar panels, whether photovoltaic or solar thermal, due to the limited space available for other options.

Site 2 is approximately 130m2 and overshadowed by the adjacent buildings and existing trees. Poor access to daylight leads us towards heat pump technologies for this site.

Site 3 is approximately 220m2 and located very close to the main railway line. It currently houses a recently decommissioned boiler house and as such, existing below ground services will need to be carefully assessed. Mechanical ventilation is being considered due to the acoustic issues of the location.

2.4 Building Analysis

All three sites are new build, with a coherent design approach but site specific environmental proposals. There is a strong desire to improve the urban realm and careful integration of renewables, for example, will need to be considered.

The proposal for site 1 is a 4 bed, 6 person, single family dwelling over 2 storeys, with private entrance and courtyard garden.

The proposal for site 2 is also for a 4 bed, 6 person single family dwelling, predominantly over 2 storeys but with a lower single storey section at one side and 3 storeys facing Lamble Street, providing access onto a roof terrace at 2nd floor level.

The proposal for site 3 consists of 3 adjacent dwellings each with 3 bedrooms; unit 1 consists of 4 storeys, while units 2 and 3 consists of 2 storeys.

3.0 Policy Context

3.1 National Policies

Energy performance requirements for projects are generally defined by a combination of UK Building Regulations, Planning Policy and Developers' individual ambitions for the site.

Building Regulations

Building Regulation Part L tightly controls the minimum performance of building fabric, equipment selection and CO_2 emissions by setting the baseline TER which must be achieved. Approved Document Part L1A is responsible for controlling new-build residential buildings.

3.2 The London Plan (2011)

Policy 5.1: Contribute to achieve an overall reduction in London's carbon dioxide emissions of 60% (below 1990 levels) by 2025.

Policy 5.2: Make the fullest contribution to minimising carbon dioxide emissions in accordance with the following energy hierarchy:

1. Be lean: use less energy
2. Be clean: supply energy efficiently
3. Be green: use renewable energy

Residential buildings:

Year	Improvement on 2010 BRegs
2010 – 2013	25% improvement
2013 – 2016	40% improvement
2016 – 2031	Zero Carbon

Policy 5.3: Minimise carbon dioxide emissions across the site, including the building and services (such as heating and cooling systems).Also, avoid internal overheating and contributing to the urban heat island effect.

Policy 5.6: Evaluate the feasibility of Combined Heat and Power (CHP) systems, and where a new CHP system is appropriate also examine opportunities to extend the system beyond the site boundary to adjacent sites. Major development proposals should select energy systems in accordance with the following hierarchy:

1) Connection to existing heating or cooling networks;

2) Site wide CHP network;

3) Communal heating and cooling.

Policy 5.7: Provide a reduction in expected carbon dioxide emissions through the use of on-site renewable energy generation, where feasible.

3.2 Local Policies

The following local planning policy documents have been reviewed in relation to energy and sustainable design:

- Camden Core Strategy 2010-2025
- Camden Development Policies 2010-2025
- Camden Planning Guidance – Sustainability (CPG 3)

Camden Council require any new development to meet the performance standards set out in the London Plan 2013.

All sites are required to achieve a minimum of Level 4 of the Code for Sustainable Homes (CSH).

A 40% reduction in regulated carbon emissions (above 2010 Building Regulations) is required for each building. It is presumed that all major developments will look to achieve this reduction through the incorporation of Low or Zero Carbon Technologies. Developers are also required to demonstrate how proposals will contribute to a decentralised energy network. Where this isn't immediately feasible, major developments need to be 'connection-ready' for future network systems, and incorporate Combined Heat and Power technology (CHP).

In addition, developers are required to demonstrate how various sustainable design principles have been incorporated within the proposals. Such principles include minimising pollution, overheating risks, generation of waste and maximising use of sustainably procured materials and promotion of biodiversity.

3.3 Client Policies

Camden Council have asked that we investigate the possibility of achieving Code Level 5 for each site, over and above the statutory requirement for Level 4. This has been addressed in our CSH Pre-Assessment.

4.0 Approach

The baseline model (that which meets the required regulations) will be created to be used as a reference source of figures to compare any considered options against.

This model is to be improved upon until the required figures result. To achieve this result, the following order of analysis follows:

Reduce Energy Demand (Be Lean) – Use less energy through a range of passive measures (i.e. enhanced building fabric and air tightness, orientation, natural daylight, solar passive heating) and active measures (i.e. efficient heating systems, mechanical ventilation with heat recovery, efficient lighting, low energy mechanical systems etc.)

Supply Energy Efficiency (Be Clean) – Once demand for energy has been minimised, investigate the feasibility of connecting to an existing/proposed heat network, implementing a site-wide heat network, on-site CHP etc.

Renewable Energy (Be Green) – Use renewable and low energy sources to reduce emissions. These technologies convert naturally occurring or otherwise unwanted produce into usable energy.

Such technologies include:

- Solar thermal heating
- Biomass heating
- Ground and air source heat pumps
- Solar photovoltaic (electricity)
- Wind turbines (electricity)
- Combined heat and power (CHP)

All the above options are to be analysed in context to their practicality and feasibility for this scheme, taking into account initial costs, available budget, potential savings, and pay back periods.

The report then concludes with final recommendations and options.

The software used to generate the results throughout this document was Elmhurst Energy Systems v 4.02 r03 (SAP 2009).

5.0 Passive Design (be lean)

The energy efficient design of the proposed development will not only meet the requirements of Level 4 of CfSH, but will also reduce the energy consumption and associated CO_2 emissions whilst maintaining high levels of comfort for the users. This will be achieved by a range of passive measures (i.e. building massing, orientation, high performance building fabric) and active measures (i.e. efficient lighting, mechanical ventilation etc.).

5.1 Building Massing

Although each of the proposed developments are constrained by the existing sites and adjoining buildings, their form and layout exploits the use of natural daylight wherever possible which reduces the reliance of artificial lighting for portions of the day. Strategic room layout has ensures that natural light is provided to rooms which benefit from it the most, i.e. kitchen/dining, living rooms, bedrooms etc. In addition, use of rooflights for sites 1 and 3 allow natural light into the centrally located stairwells. Although the availability of natural daylight is less for site 3 (due to adjacent buildings and existing trees), the principles of room layout have been maintained.

The quantity and positioning of all the glazing has been carefully considered to not only provide sufficient daylight, but also to maximise passive solar heating in winter whilst maintaining the risk of overheating to a minimal level in summer.

5.2 U-Values

The majority of traditional buildings suffer greatly from high heat loss from the facade and air leakage rates resulting in excessive ventilation, discomfort to occupants and higher fuel bills. Improving the insulation of the building fabric is one of the most cost-effective methods of reducing energy consumption and carbon emissions.

By taking a 'fabric first' approach, the building fabric of the proposed developments will achieve high levels of thermal performance beyond the minimum Building Regulations requirements to provide better temperature control and reduce the demand for space heating and cooling.

Element	Minimum Building Regulations Part L1A 2010 (W/m^{2}k)	Proposed (W/m^{2}k)	% Improvement
Walls	0.30	0.18	40%
Floors	0.25	0.12	52%
Roofs	0.20	0.13	35%
Windows & Rooflights	2.00	1.15	43%
Doors	2.00	1.15	43%

Thermal performance standards for building fabric

5.3 Infiltration

Heat loss may also occur due to air infiltration. Although this cannot be eliminated altogether, good construction detailing and the use of best practice construction techniques can minimise the amount of air infiltration into a building.

Current Part L Building Regulations (2010) sets a maximum air permeability rate of $10m^3/m^2$ at 50Pa.

Each development will improve upon this to achieve $3m^3/m^2$ at 50Pa through the application of best practice construction techniques.

6.0 Energy Efficient Services (be lean)

The following energy efficient service solutions (i.e. active measures) are proposed; these will be developed as the design progresses.

6.1 Heat Generation

The heating systems will be optimised to increase the efficiency of delivering heat to the building.

In sites 1 and 3 a 90% efficient gas boiler is proposed to deliver heat at high maximum efficiency. The system will also be fitted with weather compensation which will allow the boiler to modulate its output based on the external air temperature. This allows the boiler to response very quickly to changes in external conditions and to closely match the varying heat demand for the building.

Site 2 will be heated by an Air source Heat Pump (ASHP). *Please refer to section 8.0 for further details.*

6.2 Heating Distribution

On each site, underfloor heating is proposed to the ground floor with radiators to upper floors including time and temperature controls.

On site 2, flow and return temperatures will be carefully selected to optimise the efficiency of the ASHP (*Please refer to section 8.0 for further details).*

6.3 Ventilation

Sites 1 and 2 will be naturally ventilated, with mechanical extract ventilation provided in the bathrooms and kitchens only.

For site 3, natural ventilation is not a viable option due to the high levels or noise pollution and poor air quality associated with the nearby railway line. Therefore it is proposed that each dwelling is ventilated by a whole-house mechanical ventilation with heat recovery (MVHR) system. Each MVHR systems will be specified to be at least 90% efficient, have a specific fan power (SFP) of 0.53 and with rigid and insulated ductwork. Fresh air will be supplied to rooms where people spend the most time (bedrooms and living rooms) and stale air will be exhausted from rooms where moisture and pollutants are most often generated (kitchen and bathrooms). Each system will have a heat recovery unit which will reduce heating costs and energy consumption by transferring heat from the warm inside air being exhausted to the fresh outside air. Each system will be supplied with a summer by-pass unit, to allow the cooler summer night-time fresh air to by-pass the heat exchanger providing an immediate cooling effect as well as pre-cooling the building fabric prior to the next warm day.

6.4 Air Conditioning

There is no requirement for air conditioning in any of the properties.

6.5 Hot Water

The gas fired boiler in sites 1 and 3 will also provide the hot water via an indirect hot water cylinder.

Hot water for site 2 will be provided by an Air source Heat Pump (ASHP). *Please refer to section 8.0 for further details.*

Hot water is typically one of the largest energy consuming elements for residential uses. Although little can be done passively to reduce this consumption, improvements in plant selection and the specification of low water use appliances can offer significant savings compared to typical performance.

The proposed scheme is committed to achieving, as a minimum, a Code for Sustainable Homes level 4 rating; as such, each dwelling will reduce water consumption to at least 105 l/p/d, equivalent to a 45 l/p/d saving compared to the UK national average of 150 l/p/d.

6.6 Lighting

To maximise efficiency low energy lights will be installed throughout, with consideration given to LEDs wherever possible.

6.7 Summary of CO_2 Emissions After Lean Measures

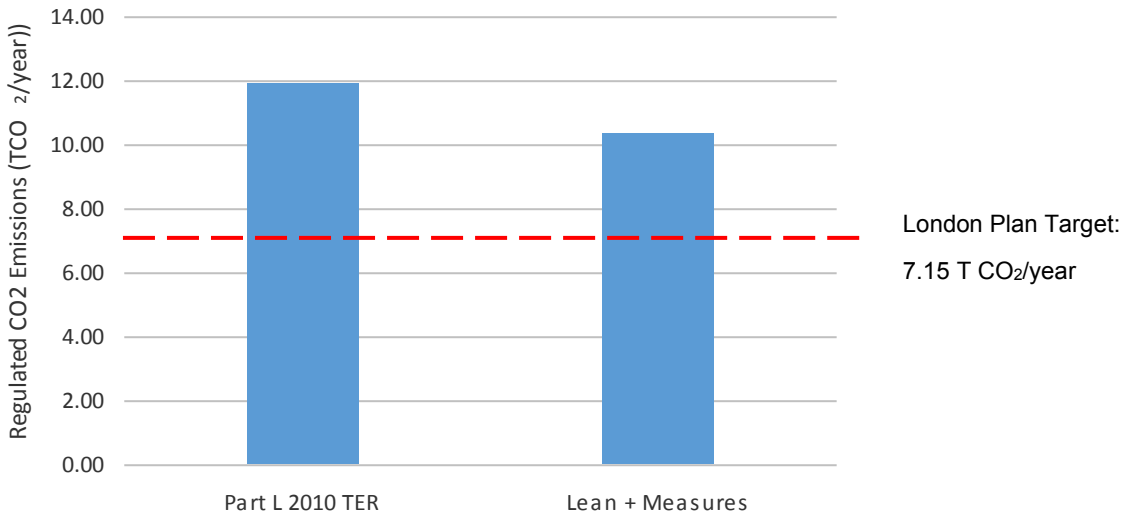
The following tables and graphs below shows the reduction in regulated CO_2 emissions for each site after lean measures have been implemented.

After lean measures, there is an overall reduction of 1.53 tonnes of regulated CO_2 emissions each year compared to the Part L 2010 TER, equivalent to an overall saving of 12.8%.

However, in order to achieve the London Plan target of a 40% reduction in CO_2 emissions, a further saving of 3.23TCO_2/year is required. This will be achieved by incorporating suitable clean and green measures.

	Site 1 (TCO2/yr)	Site 2 (TCO2/yr)	Site 3 (TCO2/yr)	Total (TCO2/yr)
Space heating	0.93	2.58	2.41	5.93
Water heating	0.58	0.94	1.51	3.03
Pump and fans	0.07	0.00	0.19	0.26
Lighting	0.24	0.28	0.63	1.15
CO_2 emissions after Lean Measures	1.83	3.81	4.74	10.38
Baseline CO_2 emissions (Based on TER)	2.15	4.20	5.56	11.91
% Improvement	**14.8%**	**9.3%**	**14.8%**	**12.8%**

Summary Table of Regulated CO_2 Emissions After Lean Measures



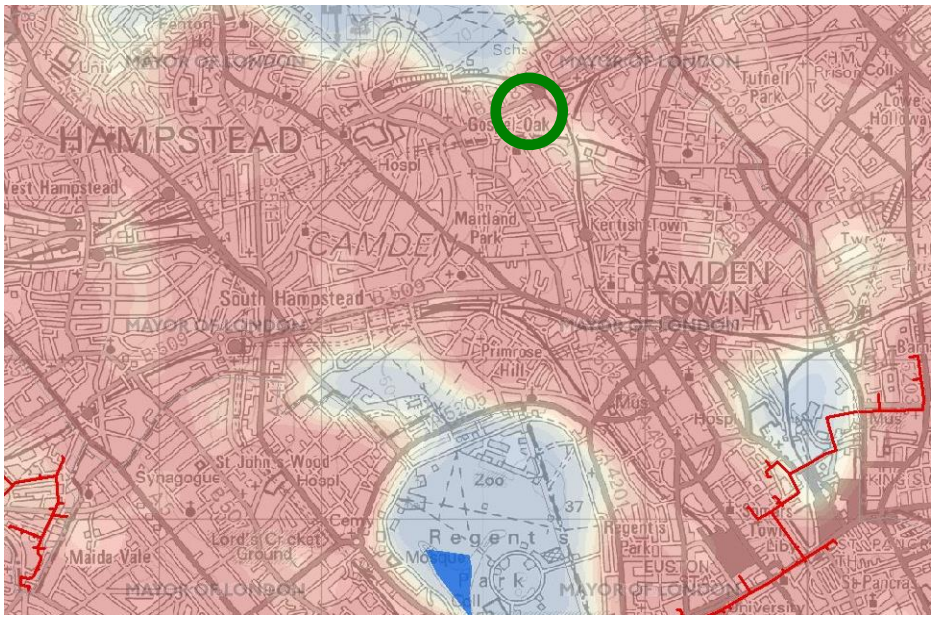
Summary Graph of Regulated CO_2 Emissions After Lean Measures

7.0 Efficient Energy Supply (be clean)

7.1 Connection to Existing District Heating Networks

The London heat map has been developed by the London Development Agency to provide a resource which supports the development of decentralised energy networks and CHP. As a well as mapping heat demands, it provides details on the location of existing heat networks, potential anchor loads and new developments which may connect or act as a catalyst for heat network development.

Analysis of the heat map suggests that there are currently no existing or proposed district heat networks in close proximity to the sites making any connection unfeasible (the nearest 'potential' network is greater than 2km away).



7.2 Combined Heat and Power

CHP generates electricity whilst also capturing usable heat that is produced in this process. This contrasts with conventional ways of generating electricity where heat is simply wasted.

CHP is ideally suited to very large mixed-use developments with a high heat demand where the heat is required at different times of the day; the Carbon Trust state that CHP's are most useful in scenarios where heating is a constant requirement for at least 5000 hours per year. This allows for the CHP to be running fairly constantly making it more financially viable and maximising CO_2 reductions.

Barrington and Lamble consists of only 5 residential units (in 3 separate buildings), and therefore has a very limited heat demand which peaks in the morning and evening, and otherwise remains fairly low during the remainder of the day.

It is concluded that due to the size and limited continuous heat demand of the proposed developments, on-site CHP is not an economically viable option.

8.0 Renewable and Low Carbon Design (be green)

In order to achieve a 40% improvement of carbon emissions on Part L 2010, the following green measures have been considered.

8.1 Solar Photovoltaic (Electricity)

Photovoltaic cells (PV) generate electricity by harnessing the energy of the sun. PV cells are available in various forms such as flat panels for mounting on roofs, or films which can be incorporated into other building fabrics such as glass or cladding or integrated into components such as roof tips. These modular units are then connected together by cables and the current generator is then passed through an inverter unit to connect to the building power supply. The efficiency of the PV cells are based on a number of factors, including the physical type of PV cell, the angle the PV arrays are fixed.

The basic PV types are:

- Mono-crystalline; these have an efficiency of 15%
- Poly-crystalline; these have an efficiency of 13%
- Thin film, these have an efficiency of 7% and can be used to integrate into other building materials.

The optimum mounting arrangement for PV arrays in south facing (within 45 degrees of south) with the array tilted at 30 to 40 degrees to 'point' towards the predominant positions of the sun.

PVs are a viable option for sites 1 and 3 due to the available space at roof level, the lack of overshadowing and the limited visual impact on the surroundings compared to other technologies (such as wind turbines). However, site 2 is overshadowed by the adjacent buildings and existing trees, which will heavily reduce the effect of solar technologies for the site.

8.2 Solar Thermal Heating

These systems can be used to produce domestic hot water by capturing heat from the sun via solar panels. The solar panels are mounted on the roof, ideally facing south and unshaded. On flat roofs, the solar panels are mounted on 'A' frames to angle them toward the sun. Certain systems utilise sun tracking mechanisms to maximise efficiency and reduce the number of panels required. Planning is not required unless the building is listed or in a conservation area.

The use of solar thermal panels has been discounted for all sites as they would be limited to domestic hot water only, and for sites 1 and 2 they would compete for the same space on roof-level with PVs, which are a more viable option. As already discussed in section 7.1 above, site 2 is overshadowed and not suitable for solar technologies.

8.3 Biomass Heating

The burning of biomass fuels such as wood chips or pellets, can be used for supplying space heating and/or domestic hot water. The carbon dioxide emitted during combustion is balanced by that absorbed during the fuels growth cycle. Therefore, biomass fuels approach a carbon neutral process. A fuel store is required and boiler flues are typically taller than a gas equivalent. Since NO_X emissions are higher than those of gas, planning and land use should be considered.

Biomass has been discounted as it emits more local pollution (i.e. NO_X) than gas, requires significant fuel to be supplied, and the large area required for storage.

8.4 Ground Source Heat Pumps

Ground source heat pumps can either absorb or reject from/to the ground depending upon if the conditioned space is being heated or cooled. The plant itself comprises of a heat pump within the building linked to a loop of buried pipework through which refrigerant or water is circulated.

There are two common types of GSHP; horizontal GSHPs which require pipes laid into the ground and vertical GSHPs which use probes inserted vertically down. Horizontal systems are the cheaper to install but have lower returns than the vertical systems.

GSHPs have been discounted due to the insufficient land available for horizontal GSHPs, and the high capital costs and ground works required for vertical GSHPs.

8.5 Air Source Heat Pumps

Air source heat pumps are similar to GSHPs, but instead of using heat exchangers buried in the ground, heat is extracted from the external ambient air and upgraded to provide space heating and/or domestic hot water.

ASHPs are much cheaper compared to GSHPs as no ground works is required, and there is very need little maintenance once installed.

ASHPs perform better with underfloor heating systems rather than with radiators because of the lower water temperatures required. Where they are coupled to radiators, the latter will be oversized to work at the lower flow and return temperatures.

The pumps are practically silent, no flues are required, and there are no planning issues.

ASHPs are a suitable and effective solution for site 2 to in order to meet 100% of the space heating (via underfloor heating and oversized radiators) and hot water demand.

8.6 Wind Turbines (Electricity)

Wind turbines harness the energy of wind to turn a rotor that is connected to an electrical generator. Since wind speed is the governing factor, wind turbines are only suited to sites with sufficient exposure to the wind. Heavily built up areas are generally impractical.

8.7 Preferred Renewable Technologies

Sites 1 and 3

Photovoltaics are proposed for sites 1 and 3 to take advantage of the available flat roof space and the lack of overshadowing.

31m^2 of roof-mounted PV panels located on the roof-tops of sites 1 and 3 will supply 3849kWh/yr and have a CO_2 saving of 2.04TCO_2/yr.

solar radiation	1022	kWh/m2/yr
PV efficiency	15.00%	
Orientation	South	
Tilt	15-30°	
Inverter and position losses	81.00%	
PV return / m2	124.17	kWh/m2/yr
	65.69	kgCO2/m2/yr
Total CO_2 savings – 31m^2	2036	kgCO2/yr
Total energy offset– 31m^2	3849	kWh/yr

Note: A total of 60m^2 of roof space has been allocated for PVs on sites 1 and 3 (as shown on the architectural layouts), therefore there is space available for additional PVs if required.

Available Roof Area for PVs (site 1 = 33m^2, site 3 = 27m^2)

Site 2

An ASHP is proposed for site 2 to meet 100% of the space heating and hot water demand. The ASHP will be specified with a minimum COP of 2.50, and its flow and return temperatures will be carefully selected to optimise the efficiency.

Although ASHPs require electricity to upgrade the heat energy present in the ambient air to generate heat at useful temperatures, it has been estimated that an ASHP with a COP of 2.5 could reduce the CO2 emissions of site 2 by 1.75TCO_2/yr.

8.8 Summary of CO_2 Emissions After Green Measures

The following table below shows the regulated CO_2 emissions for each site after green measures have been implemented.

The incorporation of 31m^2 of PV (sites 1 and 3) and an efficient ASHP to supply 100% of the space heating and hot water demand is estimated to reduce the regulated CO_2 emissions by 3.79TCO_2/yr., equivalent to 36.5%.

	TER (TCO2/yr)	Lean (TCO2/yr)	Clean (TCO2/yr)	Green (TCO2/yr)	Overall % Improvement
Site 1(TCO2/yr)	2.15	1.83	1.83	1.24	**42.3%**
Site 2 (TCO2/yr)	4.20	3.81	3.81	2.06	**51.0%**
Site 3 (TCO2/yr)	5.56	4.74	4.74	3.29	**40.8%**
Total	11.91	10.38	10.38	6.59	**44.6%**

Summary Table of Regulated CO_2 Emissions After Green Measures

9.0 Summary

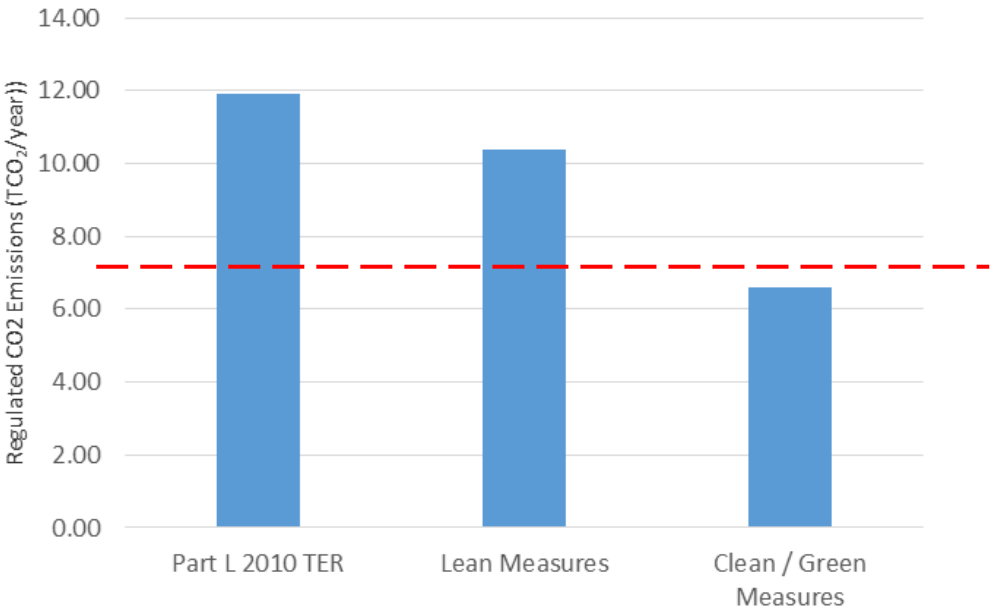
The proposed energy strategy for Barrington and Lamble (through appropriate use of the facade, efficient system design and the use of renewable energy systems) achieves the following savings in CO_2 emissions:

An overall 44.6% reduction in regulated CO_2 emissions compared to the Part L 2010 TER, which consists of:

- A 12.8% reduction due to energy efficiency measures alone;
    - Building massing which maximises natural daylight (sites 1 and 3) and solar passive heating where feasible
    - Building fabric and air tightness which outperforms Part L 2010 (all sites)
    - Whole-house mechanical ventilation with heat recovery (site 3)
    - 100% low energy lighting (all sites)
    - 90% gas boiler system (sites 1 and 3).
- A 36.5% reduction due to the inclusion of renewable technologies;
    - 31m^2 of PV panel (sites 1 and 3)
    - An ASHP with a minimum COP of 2.5 (site 2).

	Regulated CO_2 Emissions (T CO_2/year)	**Savings (TCO_2/year)**	**% Saving**
Part L 2010 TER	11.91	-	-
Lean Measures	10.38	1.53	12.8%
Clean / Green Measures	6.59	3.79	36.5%
Cumulative Savings		**5.32**	**44.6%**

Summary Table of Regulated CO_2 Emissions



London Plan Target:

7.15 T CO_2/year

Summary Graph of Regulated CO_2 Emissions

Part L 2010 TER

11.91 TCO_2/year

Barrington and Lamble

6.59 TCO_2/year

Summary of Carbon Footprint (Regulated Emissions)

10.0 Appendix - Preliminary SAP Results

1) **Gas Boiler**

2) **Gas Boiler and PVs**

3) **ASHP**

1) Gas Boiler

Property Reference: 42360 - Prelim
Survey Reference: C4 - Gas
Property: Gospel Oak, London

Issued on Date: 25.Mar.2014
Prop Type Ref:

SAP Rating:	84 B	**CO2 Emissions (t/year):**	1.57	**DER:** 15.14 Pass	**Reduction:** 14.8%	**FEE:** 45.0	**ZC8:**	0.00
Environmental:	86 B	**General Requirements Compliance:**	Pass	**TER:** 17.76		**HLP:** 1.21	**Energy cost:**	£ 443

CfSH Results	**Version:** CfSH November 2010	**ENE1 Credits:** 1.8	**ENE2 Credits:** 7.2	**ENE7 Credits:** 0	**CfSH Level:**	3

Surveyor: Jason Page, Tel: 01206 224270, Fax: 01206 843715 Surveyor ID: 2667-0022
Address: The Crescent, Colchester Business Park, Colchester, Essex, CO4 9YQ
Client:

Software Version: Elmhurst Energy Systems SAP2009 Calculator (Design System) version 4.02r03
SAP version: SAP 2009, Regs Region: England and Wales (Part L1A 2010), Calculation Type: New Dwelling As Designed

SUMMARY FOR INPUT DATA FOR New Build (As Designed)

1 TER and DER

Fuel for main heating:	Mains gas	
Fuel factor:	1.00 (mains gas)	
Target Carbon Dioxide Emission Rate (TER)	17.76 kg/m^2	
Dwelling Carbon Dioxide Emission Rate (DER)	15.14 kg/m^2	OK

2 Fabric U-values

Element	Average	Highest	
External wall	0.18 (max. 0.30)	0.18 (max. 0.70)	OK
Floor	0.13 (max. 0.25)	0.15 (max. 0.70)	OK
Roof	0.13 (max. 0.20)	0.13 (max. 0.35)	OK
Openings	1.20 (max. 2.00)	1.20 (max. 3.30)	OK

2a Thermal bridging

Thermal bridging calculated using user-specified y-value of 0.060

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: 90.0% SEDBUK2009 Minimum: 88.0%	OK
Secondary heating system:	None	

5 Cylinder insulation

Hot water storage	Nominal cylinder loss: 1.75 kWh/day Permitted by DBSCG 2.03	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

8 Mechanical ventilation

Not applicable

9 Summertime temperature

Overheating risk (Thames Valley):	Slight	OK
Based On:		
Overshading:	Average	
Windows facing North:	14.56 m^2, No overhang	
Windows facing South:	6.96 m^2, No overhang	
Windows facing West:	11.92 m^2, No overhang	
Ventilation rate:	8.00	
Blinds/curtains:	None	

10 Key features

External wall U-value	0.18 W/m^2K
Floor U-value	0.12 W/m^2K
Floor U-value	0.15 W/m^2K
Window U-value	1.20 W/m^2K
Party wall U-value	0.00 W/m^2K
Air permeability	3.0 m^3/m^2h

2) Gas Boiler and PVs

Property Reference: 42360 - Prelim
Survey Reference: C4 - Gas + PV
Property: Gospel Oak, London

Issued on Date: 25.Mar.2014
Prop Type Ref:

SAP Rating:	88 B	**CO2 Emissions (t/year):**	1.16	**DER:** 11.45 Pass	**Reduction:** 35.5%	**FEE:** 45.0	**ZC8:**	0.00
Environmental:	90 B	**General Requirements Compliance:**	Pass	**TER:** 17.76		**HLP:** 1.21	**Energy cost:**	£ 334

CfSH Results	**Version:** CfSH November 2010	**ENE1 Credits:**	3.9	**ENE2 Credits:**	7.2	**ENE7 Credits:**	1	**CfSH Level:**	4

Surveyor: Jason Page, Tel: 01206 224270, Fax: 01206 843715 Surveyor ID: 2667-0022
Address: The Crescent, Colchester Business Park, Colchester, Essex, CO4 9YQ
Client:

Software Version: Elmhurst Energy Systems SAP2009 Calculator (Design System) version 4.02r03
SAP version: SAP 2009, Regs Region: England and Wales (Part L1A 2010), Calculation Type: New Dwelling As Designed

SUMMARY FOR INPUT DATA FOR New Build (As Designed)

1 TER and DER

Fuel for main heating:	Mains gas	
Fuel factor:	1.00 (mains gas)	
Target Carbon Dioxide Emission Rate (TER)	17.76 kg/m^2	
Dwelling Carbon Dioxide Emission Rate (DER)	11.45 kg/m^2	OK

2 Fabric U-values

Element	Average	Highest	
External wall	0.18 (max. 0.30)	0.18 (max. 0.70)	OK
Floor	0.13 (max. 0.25)	0.15 (max. 0.70)	OK
Roof	0.13 (max. 0.20)	0.13 (max. 0.35)	OK
Openings	1.20 (max. 2.00)	1.20 (max. 3.30)	OK

2a Thermal bridging

Thermal bridging calculated using user-specified y-value of 0.060

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: 90.0% SEDBUK2009 Minimum: 88.0%	OK
Secondary heating system:	None	

5 Cylinder insulation

Hot water storage	Nominal cylinder loss: 1.75 kWh/day Permitted by DBSCG 2.03	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

8 Mechanical ventilation

Not applicable

9 Summertime temperature

Overheating risk (Thames Valley):	Slight	OK
Based On:		
Overshading:	Average	
Windows facing North:	14.56 m^2, No overhang	
Windows facing South:	6.96 m^2, No overhang	
Windows facing West:	11.92 m^2, No overhang	
Ventilation rate:	8.00	
Blinds/curtains:	None	

10 Key features

External wall U-value	0.18 W/m^2K
Floor U-value	0.12 W/m^2K
Floor U-value	0.15 W/m^2K
Window U-value	1.20 W/m^2K
Party wall U-value	0.00 W/m^2K
Air permeability	3.0 m^3/m^2h
Photovoltaic array	

3) ASHP

Building Regulation Compliance

Property Reference: 42360 - Prelim
Survey Reference: C4 - ASHP
Property: Gospel Oak, London

Issued on Date: 25.Mar.2014
Prop Type Ref:

SAP Rating:	86 B	**CO2 Emissions (t/year):**	1.50	**DER:** 14.59 Pass	**Reduction:** 51.0%	**FEE:** 45.0	**ZC8:**	0.00
Environmental:	87 B	**General Requirements Compliance:** Pass		**TER:** 29.78		**HLP:** 1.21	**Energy cost:**	£ 408

CfSH Results	**Version:** CfSH November 2010	**ENE1 Credits:** 5.3	**ENE2 Credits:** 7.2	**ENE7 Credits:** 0	**CfSH Level:**	4

Surveyor: Jason Page, Tel: 01206 224270, Fax: 01206 843715 Surveyor ID: 2667-0022
Address: The Crescent, Colchester Business Park, Colchester, Essex, CO4 9YQ
Client:

Software Version: Elmhurst Energy Systems SAP2009 Calculator (Design System) version 4.02r03
SAP version: SAP 2009, Regs Region: England and Wales (Part L1A 2010), Calculation Type: New Dwelling As Designed

SUMMARY FOR INPUT DATA FOR New Build (As Designed)

1 TER and DER

Fuel for main heating:	Electricity	
Fuel factor:	1.47 (electricity)	
Target Carbon Dioxide Emission Rate (TER)	29.78 kg/m^2	
Dwelling Carbon Dioxide Emission Rate (DER)	14.59 kg/m^2	OK

2 Fabric U-values

Element	Average	Highest	
External wall	0.18 (max. 0.30)	0.18 (max. 0.70)	OK
Floor	0.13 (max. 0.25)	0.15 (max. 0.70)	OK
Roof	0.13 (max. 0.20)	0.13 (max. 0.35)	OK
Openings	1.20 (max. 2.00)	1.20 (max. 3.30)	OK

2a Thermal bridging

Thermal bridging calculated using user-specified y-value of 0.060

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 Illustrative Heat Pump Air source to underfloor 6.1 kW	
Secondary heating system:	None	

5 Cylinder insulation

Hot water storage	No cylinder	

6 Controls

Space heating controls:	Time and temperature zone control	OK
Hot water controls:	No cylinder	

7 Low energy lights

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

8 Mechanical ventilation

Not applicable

9 Summertime temperature

Overheating risk (Thames Valley):	Slight	OK
Based On:		
Overshading:	Average	
Windows facing North:	14.56 m^2, No overhang	
Windows facing South:	6.96 m^2, No overhang	
Windows facing West:	11.92 m^2, No overhang	

Ventilation rate:	8.00
Blinds/curtains:	None

10 Key features

External wall U-value	0.18 W/m^{2}K
Floor U-value	0.12 W/m^{2}K
Floor U-value	0.15 W/m^{2}K
Window U-value	1.20 W/m^{2}K
Party wall U-value	0.00 W/m^{2}K
Air permeability	3.0 m^3/m^{2}h

Appendix C.3 - Code for Sustainable Homes Pre-Assessment Report

Billericay
Colchester
London
Norwich

Colchester
874 The Crescent
Colchester Business Park
Colchester
Essex CO4 9YQ
T: 01206 224270
F: 01206 843715

www.ingletonwood.co.uk

Gospel Oak Infill Sites

Burd Haward Architects
Job No. 42360

Code for Sustainable Homes Pre-Assessment
Rev -

Author:	JP
Checked by:	KC
Date:	02nd August 2013
Status:	Issued

Ingleton Wood

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A – Results from Pre-Assessment Tools

DOCUMENT CONTROL

Project Information

Job Number: 42360

Project Title: Gospel Oaks Infill Sites, London

Client: Burd Haward Architects

File Location: Colchester

Document Check

Prepared by: **Jason Page** Signed: JPage

Issue	Date	Status
1	02-08-13	Issued
2		
3		
4		

INTRODUCTION TO THE CODE FOR SUSTAINABLE HOMES

The Code for Sustainable Homes (the Code) is an environmental assessment method which assesses environmental performance in a two stage process (Design stage and Post-construction) using objective criteria and verification. The results of the Code assessment are recorded on a certificate assigned to the dwelling. It is a national standard for use in the design and construction of new homes with a view to encouraging continuous improvement in sustainable home building.

The Code for sustainable homes covers nine categories of sustainable design including:

- Energy and CO2 Emissions
- Water
- Materials
- Surface Water Run-off
- Waste
- Pollution
- Health and Wellbeing
- Management
- Ecology

Each category includes a number of environmental issues. Each issue is a source of impact on the environment which can be assessed against a performance target and awarded one or more credits. Performance targets are more demanding than the minimum standard needed to satisfy Building Regulations or other legislation. They represent good or best practice, are technically feasible, and can be delivered by the building industry.

In addition to the mandatory standards, each design category scores a number of percentage points. The total number of percentage points establishes the Level or Rating for the dwelling. The certificate illustrates the rating achieved with a row of stars. A star is awarded for each level achieved. Where an assessment has taken place by where no rating is achieved, the certificate states that zero stars have been awarded.

OVERALL CODE LEVELS AND SCORING OF DEVELOPMENTS

Table 1: Relationship between Total percentage points score and Code Level	
Total percentage points score (equal to or greater than)	**Code Levels**
36 Points	Level 1 (★)
48 Points	Level 2 (★★)
57 Points	Level 3 (★★★)
68 Points	Level 4 (★★★★)
84 Points	Level 5 (★★★★★)
90 Points	Level 6 (★★★★★★)

BREAKDOWN OF CATERGEORIES AND THEIR WEIGHTINGS

Table 2: Total Credits available, weighting factors and Points		
Categories of environmental impact	**Total credits in each category**	**Weighting factor (% points contribution)**
Category 1 Energy & Co2 Omissions	31	36.4%
Category 2 Water	6	9%
Category 3 Materials	24	7.2%
Category 4 Surface Water Run-off	4	2.2%
Category 5 Waste	8	6.4%
Category 6 Pollution	4	2.8%
Category 7 Health & Wellbeing	12	14%
Category 8 Management	9	10%
Category 9 Ecology	9	12%
Total	**-**	**100%**

PROJECT INFORMATION

Ingleton Wood was instructed by Burd Haward Architects to undertake a Code for Sustainable Homes pre-assessment for the Gospel Oak Infill Sites development in London. The development proposals comprise 6 number units across 3 sites as follows:

- Site 1: 1 x 4 Bed House
- Site 2: 1 x 2 Bed House
- Site 3: 2 x 3 Bed Maisonettes, 1 x 2 Bed Maisonette

All units are required to achieve a minimum of Level 4 of the Code for Sustainable Homes (CSH), with the option to uplift to Level 5 and the purpose of this report is to provide guidance and recommendations to assist with meeting this requirement.

REPORT PROCESS

This report is a guideline of what can be achieved and what standards should be strived for. The report has been created making assumptions, and these assumptions have been based on information provided in the clients brief and through the Pre-Assessment meeting.

A formal design stage assessment should be undertaken when the design stage of the project is complete (late RIBA Stage D / early Stage E).

RESULTS OF PRELIMINARY ASSESSMENT

Ingleton Wood has prepared a CSH preliminary assessment of the proposed development using the CSH Pre-Assessment Estimator Tool. The predicted rating and code level summary can be seen on the graphs provided and is a guide of what can be achieved. The evidence required by the assessor at design stage and post construction review stage will need to be supplied in order for the assessment to achieve a rating. The evidence shown in the pre-assessment is intended as a guide only, for full details please refer to the evidence schedule. Used to achieve a rating is set out in the Code for Sustainable Homes Technical Guide and is a basis to assess what is required by the BRE.

It should be noted that this Pre-Assessment is based on the Nov 2010 version of the Code. If the development is not registered under Nov 2010 an additional pre-assessment may have to be carried out.

Site 1 & 3 meet all Code level 4 Pre-Assessment meets all mandatory requirements for Level 4 and scores **72.50 points** (68 is required for Level 4).
With the increase to 4kWp of PV and the inclusion of rainwater harvesting site 1 & 3 meet all Code Level 5 mandatory requirements and scores **84.23 points** (84 is required for Level 5).

Site 2 meet all Code level 4 Pre-Assessment meets all mandatory requirements for Level 4 and scores **70.40 points** (68 is required for Level 4).
It is not considered that it is feasibly possible to uplift to Code 5 on this site.

The results from the pre-assessment tools can be seen in Appendix A.

CREDIT SUMMARY

	Credits Available	Site 1 & 3 Code 4	Site 1 & 3 Code 5	Site 2 Code 4
ENE				
1	10	3.5	9.0	4.5
2	9	7.0	7.0	7.0
3	2	2	2	2
4	1	1	1	1
5	2	2	2	2
6	2	2	2	2
7	2	1	2	0
8	2	2	2	2
9	1	1	1	1
WAT				
1	5	3	5	3
2	1	1	1	1
MAT				
1	15	12	12	12
2	6	6	6	6
3	3	3	3	3
SUR				
1	2	0	2	0
2	2	2	2	2
WAS				
1	4	4	4	4
2	3	3	3	3
3	1	1	1	1
POL				
1	1	1	1	1
2	3	3	3	0
HEA				
1	3	0	0	0
2	4	3	3	3
3	1	1	1	1
4	4	4	4	4
MAN				
1	3	3	3	3
2	2	2	2	2
3	2	2	2	2
4	2	2	2	2
ECO				
1	1	1	1	1
2	1	0	0	0
3	1	1	1	1
4	4	2	2	2
5	2	0	0	0
SCORE		**72.50**	**84.23**	**70.40**

CREDIT SCORING

ENE 1	Mandatory element	Credits available	Credits achieved
Dwelling emission rate	Level 4-6	10	3.5 | 4.5 | 9.0

Credits are awarded for performing beyond Part L1.

SAP calculation worksheets are required by an accredited energy assessor to demonstrate DER and TER calculations. Credits achieved under this criterion will vary for every plot. A breakdown of the expected scores for both ENE1 and ENE 2 based on preliminary SAP calculations can be found below.

It should be noted that this specification has been produced using preliminary layouts for 1 sample unit, variations may occur where applied to other units. Full SAP calcs are recommended to be carried out ASAP in order to verify the specification.

Preliminary Specification

	Sites 1 & 3	**Site 2**
Walls	0.18 w/m^{2}k	-
Party Wall	Fully filled with edge sealing	-
Roof	0.13 w/m^{2}k	-
Floor	0.12 w/m^{2}k	-
Windows	1.20 w/m^{2}k double glazed	-
Doors	1.20 w/m^{2}k	-
Air Test	3 m^3/m^2.hr @ 50Pa	-
Thermal Bridging	Y = 0.06 Enhanced ACD or careful detailing required	-
Boiler	90% efficient Gas Load Compensator	250% efficient ASHP Load Compensator
Controls	Time and Temperature zone control	-
Output	Under floor heating in thin screed	-
Ventilation	Natural Ventilation with extract in kitchens/bathrooms NOTE MVHR may be required to site 3 for acoustic purposes	-
PV	0.9 kWp (approx. 7.2m^2) 4.0 kWp (approx. 32m^2) for Code 5 only South facing 30degress inclination	None Required

Plot	ENE 1	ENE 2	TOTAL	Notes
Site 1	3.5	7.0	10.5	
Site 2	4.5	7.0	11.5	
Site 3	3.5	7.0	10.5	
Code 5 (site 1&3 only)	9.0	7.0	16.0	

Evidence Overview
DS - SAP calculations
PCS - As per DS

ENE 2 Fabric Energy Efficiency (FEE)	Mandatory element	Credits available	Credits achieved
	Level 5/6	9	7.0

Credits are awarded for efficiency of fabric.

SAP calculation worksheets are required by an accredited energy assessor to demonstrate FEE achieved. Credits are awarded as per the table below.
The basic fabric specification achieves the mandatory level for Code Level 5 which should be targeted.
A breakdown of the expected scores based on preliminary SAP calculations can be found under ENE 1 information.

FEE (kwh/m2/yr)		Credits	Mandatory Elements
Flats & Mid Terrace	**End Terrace & Detached**		
<48	<60	3	
<45	<55	4	
<43	<52	5	
<41	<49	6	
<39	<46	7	Levels 5 & 6
<35	<42	8	
<32	<38	9	

Evidence Overview
DS - SAP calculations
PCS - As per DS

ENE 3	Mandatory element	Credits available	Credits achieved
Energy Display Devices	None	2	2

Credits are awarded where electricity and primary fuel are monitored by an appropriate smart meter.

1 credit can be achieved for the installation of an electrical only energy display device.
1 further credit is available for an energy display device that monitors both electricity and gas. On ASHP only electrical monitoring is required.
It is advised to check device is correctly specified before installation.

It is recommended that the provision of electrical only meters is investigated as they tend to be a low cost option.

Evidence Overview
DS - A letter of intent is required, or evidence showing the type of device and its specification
PCS - As per DS

ENE 4	Mandatory element	Credits available	Credits achieved
Drying Space	None	1	1

Credits awarded for installation of appropriate measures to allow clothes drying.

A drying line of at least 6m in length be installed over the bath with adequate ventilation, 1 credit is available.

Evidence Overview
DS - A letter of intent is required, or evidence showing the above including drawings showing drying lines and fixings
PCS - As per DS

ENE 5	Mandatory element	Credits available	Credits achieved
Energy Labelled white goods	None	2	2

Credits are awarded for provided energy labelled white goods to the following ratings:

Fridge/Freezers	A+
Washing Machines	A
Dishwashers	A
Washer/Driers	B
Tumble Driers	B

All units are to be provided a leaflet describing the EU energy labelling scheme, ideally within the Home User Guide (HUG). Any white goods that are provided or offered for sale must be compliant with the ratings above.

Where white goods are not provided only 1 credit is available under this criteria.

Evidence Overview
DS - A letter of intent is required, or evidence showing white goods to be provided with manufacturers info showing ratings
PCS - As per DS

ENE 6 External Lighting	Mandatory element	Credits available	Credits achieved
	None	2	2

Credits awarded for providing energy efficient space and security lighting.

Space Lighting – Fittings should be capable of taking energy efficient light bulbs.

Burglar Security Lighting – Should have max wattage of 150W, and be controlled via PIR sensors and daylight cutoff sensors.

Other Security Lighting – Fittings should be capable of taking energy efficient light bulbs and be controlled by daylight cutoff sensors or time switch.

Evidence Overview
DS - A letter of intent is required, or evidence showing the above including drawings and manufacturers information.
PCS - As per DS

ENE 7 Low or Zero Carbon Technologies	Mandatory element	Credits available	Credits achieved
	None	2	1 | 0 | 2

Credits are awarded for the provision of low or zero carbon technologies.

Approximately 0.9kwp of PV is required for Sites 1 & 3 where gas boilers are proposed I order to achieve mandatory requirement under ENE1. This is sufficient for 1 credits.
For Site 2 no PV is required so 0 credits are available.
For the Code 5 option 4.0kWp of PV is proposed, 2 credits will be achieved

Evidence Overview
DS - SAP Calculations
A letter of intent or evidence showing the above including manufacturers information is required
PCS - As per DS

ENE 8 Cycle Storage	Mandatory element	Credits available	Credits achieved
	None	2	2

Credits are awarded for providing safe and secure cycle storage.

Cycle spaces should be provided at the following rates:

	1 Bed Dwellings	**2 or 3 Bed Dwellings**	**4 + Bed Dwellings**
1 Credit	0.5	1	2
2 Credits	1	2	4

Cycle storage should be provided by Sheffield type stand set in a concrete base to at least 300mm with a welded anchor T bar.
1 Sheffield stand is adequate for storage of 2 cycles. Space required for 4 cycles is 2m depth by 2.5m length. Other storage methods can be considered however they should be cable of locking a cycle by both frame and wheel using a standard D-lock.
Entrance door requires a mortice deadlock or mortice sash lock conforming to BS 3621:2007.

Evidence Overview
DS - A letter of intent is required, or evidence showing the above including drawings and manufacturers information
PCS - As per DS

ENE 9 Home Office	Mandatory element	Credits available	Credits achieved
	None	1	1

Credits are awarded where a suitable home office location is provided in the dwelling.

In 1 & 2 Bed dwellings the home office can be in any room other than the kitchen or bathroom.
For 3 Bed plus dwellings the home office cannot be in the main bedroom or Living room.

The home office requires a wall space of 1.8m length to allow for desk, chair and filing cabinet. The space must be serviced with 2 double power sockets and 1 telephone socket.
The home office must include an openable window of at least 0.5m2 (a door does not count) and have a daylight factor of at least 1.5% -
I can check for daylight factor compliance if required (usually the smaller the room to the larger the windows the better).

Evidence Overview
DS - A letter of intent is required, or evidence showing the above including drawings and/or specification
PCS - As per DS

WAT 1	Mandatory element	Credits available	Credits achieved
Indoor Water Use	All Levels	5	3 | 5

Credits are awarded for the use of low flow water fittings.

Fittings/restrictors should be installed to the minimum as follows in order to achieve 105l/person/day for Code 4. Variations to this spec are possible but should be checked with myself in the first instance to make sure compliance is still achieved.

Toliet	6/4L Dual Flush
Bath	150L to overflow
Shower	8L per minute
Kitchen Taps	6L per minute
Basin Taps	4L per minute
Washing Machine	8.17L per kg or none supplied
Dishwasher	1.25L per place setting or none supplied

For Code 5 rainwater harvesting should be utilised to achieve a minimum of 80l/person/day

Evidence Overview
DS - A letter of intent is required, or evidence showing the above including drawings and manufacturers information
PCS - As per DS

WAT 2	Mandatory element	Credits available	Credits achieved
External Water Use	None	1	1

Credits are awarded for externally recycled rainwater use.

Credit is awarded for the installation of a correctly specified water butt serving the private space. This is normally 200L in size.
Where balconies only are provided this credit is awarded by default

Evidence Overview
DS - Site plan
PCS - As per DS

MAT 1 Environmental Impact of Materials	Mandatory element	Credits available	Credits achieved
	All Levels	15	12

Credits are awarded for materials selected with good green guide ratings.

The following constructions should be checked against the Green Guide.

- Roof
- External Walls
- Internal Walls
- Upper and Ground Floor (including separating floors)
- Windows

Green guide ratings should be obtained for each element, it is likely that the number of credits here will fluctuate depending on specification.
10 credits are assumed as an average of A grade will be achieved.

Evidence Overview
DS - Drawings showing elements as above
PCS - As per DS

MAT 2 Responsible Sourcing – Basic Elements	Mandatory element	Credits available	Credits achieved
	None	6	6

Credits are awarded for materials selected through Environmental Management Systems (EMS) such as ISO 14001.

All timber used on build should be sourced using PEFC or FSC. All other materials should be sourced that have EMS systems for both key process and supply chain. Please see evidence schedule for full list of acceptable EMS routes.

At least 5 of the following elements needs to be assessed, and the more that are assessed the better:

- Frame
- Ground Floor
- Upper Floor
- Roof (structure and cladding)
- External Walls
- Internal Walls
- Foundation/Substructure

- Staircase

Evidence Overview
DS - A letter of intent is required, or evidence showing selected materials and EMS certificates
PCS - I will complete the MAT 2 calculator tool showing what is likely to be present. **An EMS or PEFC/FSC certificate should be sourced for as many materials as possible throughout the build process**

MAT 3	Mandatory element	Credits available	Credits achieved
Responsible Sourcing – Finishing Elements	None	3	3

Credits are awarded for materials selected through Environmental Management Systems (EMS) such as ISO 14001.

All timber used on build should be sourced using PEFC or FSC. All other materials should be sourced that have EMS systems for both key process and supply chain. Please see evidence schedule for full list of acceptable EMS routes.

At least 5 of the following elements needs to be assessed, and the more that are assessed the better:

- Staircase
- Windows
- External and Internal Doors
- Skirting
- Panelling
- Furniture
- Fascias
- Any Other Significant Use (can include kitchens)

Evidence Overview
DS - A letter of intent is required, or evidence showing selected materials and EMS certificates
PCS - I will complete the MAT 3 calculator tool showing what is likely to be present. **An EMS or PEFC/FSC certificate should be sourced for as many materials as possible throughout the build process**

SUR 1	Mandatory element	Credits available	Credits achieved
Surface Water Run-Off	All Levels	2	0 | 2

Mandatory element requires run off rate post development to be lower than pre development levels.
Credits are awarded for improved water quality to watercourse.

For the mandatory element, it must be demonstrated clearly that run-off rates have been reduced. Please note that this can be shown by default, by showing on drawings that the area of impermeable area pre-development is greater than or equal to post development.

For credits it should be demonstrated that there is no discharge from site for rainfall up to 5mm and that the runoff from all hard surfaces will receive an appropriate level of treatment in accordance to the SUDs manual. An engineer should show calculations demonstrating this in a report or on the SUR1 template.

Where rainwater harvesting (or other SUD measures) are to be used on site, the criteria for the tradable credits should be demonstrated by the engineer.

Evidence Overview
DS - Pre and post development drawings including areas of impermeable surfaces.
PCS - As per DS

SUR 2	Mandatory element	Credits available	Credits achieved
Flood Risk	None	2	2

Credits are awarded for not building in a flood plain.

The development is in EA flood zone 1(low risk) so 2 credits are achieved.
A simple Flood risk Assessment is required confirming low risk of flooding from all sources

Evidence Overview
DS - Flood Risk Assessment showing low risk of flooding from all sources
PCS - As per DS

WAS 1 Household Waste	Mandatory element	Credits available	Credits achieved
	All Levels	4	4

Credits are awarded for the provision of waste storage space.

Mandatory element requires external storage space to hold the greater of that provided by the Local Authority or 30L + (70L x number of Bedrooms). The space must conform to the IDP checklist.

Credits are awarded for supplying internal recyclable waste storage areas. Camden Council operates a pre sorted collection scheme, 3 bins of at least 7L each (and total capacity of at least 30L) is required in a dedicated position inside the dwelling. Freestanding bins DO NOT COMPLY with these criteria; they must be permanently fixed, usually with a base unit in the kitchen.

Evidence Overview

DS - Drawings showing size and location of bin storage (internal and external)
Completed IDP checklist

PCS - As per DS

WAS 2 Site Waste Management	Mandatory element	Credits available	Credits achieved
	None	3	3

Credits are awarded for diverting site waste from landfill.

A Site Waste Management Plan (SWMP) should contain the following:

- Target benchmark for resource efficiency
- Procedures and commitments to minimise non-hazardous waste at design stage
- Procedures for minimising hazardous waste
- Monitoring, measuring and reporting of hazardous and non-hazardous waste

There should be a commitment to minimise waste to landfill by either:

- Reuse on site
- Reuse on other sites
- Salvage / reclaim
- Return to supplier or take back scheme
- Recovery and recycling using an approved waste management contractor
- Compost

At least 85% by weight or volume should be achieved.

Evidence Overview

DS - A letter of intent is required, or SWMP showing procedures as set out in checklists WAS2 a, WAS2b , WAS2c

PCS - As per DS

WAS 3 Composting	Mandatory element	Credits available	Credits achieved
	None	1	1

Credits are awarded for supplied storage for compostable waste.

Camden Council collects compostable waste.

Information regarding the composting bins and use should be given to dwellings; this would ideally be within the HUG.

Space for an internal bin within the kitchen must be provided within the kitchen with capacity of at least 7L.

Evidence Overview

DS - A letter of intent is required, or drawings and manufacturers info showing internal and external facilities.
Checklist IDP

PCS - As per DS

POL 1 GWP of Insulants	Mandatory element	Credits available	Credits achieved
	None	1	1

Credits are awarded for the use of insulating materials with a GWP of less than 5.

All insulants should be used with a GWP of less than 5, manufacturers literature should be obtained that shows compliance. This includes:

- Roofs, Including loft access
- Walls, Internal and External including lintels and acoustic insulation
- Floors, including ground and upper floors
- How water cylinder, pipe insulation and other thermal stores
- Cold water storage tank
- External doors

Evidence Overview

DS - A letter of intent is required, or specifications and manufacturers info showing insulation specified

PCS - As per DS

POL 2 NO_X emissions	Mandatory element	Credits available	Credits achieved
	None	3	3 | 0

Credits are awarded for heating systems that have low NOx emissions.

The gas boiler proposed should achieve less than 40 mg/kwh dry NOx emissions for 3 credits. Where ASHP is used 0 credits are available.

Evidence Overview

DS - A letter of intent is required, or specifications and manufacturers info showing boiler class

PCS - As per DS

HEA 1	Mandatory element	Credits available	Credits achieved
Daylighting	None	3	0

Credits are awarded for good daylight design.

Daylight calculations are required to show daylight factors and working plane achieved in living rooms, studies and kitchens.

Some credits may be available however daylight calculations are required to verify number of credits gained.

Evidence Overview
DS - Daylight calculations
PCS - As per DS

HEA 2	Mandatory element	Credits available	Credits achieved
Sound Insulation	None	4	3

Credits awarded for building beyond Part E requirements.

A programme of pre completion testing by a UKAS accredited body is required to confirm an improvement over Part E greater than 5dB.

Evidence Overview
DS - A letter of intent is required intention to perform pre completion testing
Or confirmation that dwellings have been registered with RDL, and details of which RD are being used
PCS - Certificates confirming compliance

HEA 3	Mandatory element	Credits available	Credits achieved
Private Space	None	1	1

Credits are awarded for providing private outdoor space.

Private space must be greater than 1.5m2 per bedroom, balconies are acceptable if accessed via level access threshold.

Private space must be accessible as per checklist IDP.

Evidence Overview
DS - A letter of intent, or drawings showing size of private open space and checklist IDP
PCS - As per DS

HEA 4	Mandatory element	Credits available	Credits achieved
Lifetime Homes	None	4	4

Credits are awarded for Lifetime Homes (LTH) Compliance.

Development is designed to LTH.

All 16 LTH criteria must be met to achieve any credits under this issue, the criteria can be found on the Habinteg website http://www.lifetimehomes.org.uk.

It should be noted that the HEA 4 checklist should be completed by the developer/designer, and will be checked by myself through drawings/site visit. Any plan/ specifications submitted should show compliance with all 16 issues.

Evidence Overview
DS - Completed HEA4 checklist
PCS - As per DS

MAN 1	Mandatory element	Credits available	Credits achieved
Home User Guide	None	3	3

Credits are awarded for providing a Home User Guide (HUG) to dwellings.

A HUG should be provided to all dwellings and should cover all the issues as set out in Checklist MAN 1 part 1 and MAN 1 part 2.

Evidence Overview
DS - A letter of intent
PCS - Sample of HUG and confirmation of supply to all dwellings

MAN 2	Mandatory element	Credits available	Credits achieved
CCS	None	2	2

Credits are awarded for performing well under the Considerate Constructors Scheme (CCS).

The site should be registered under the CCS.

For 1 credit best practice certificate should be achieved scoring between 25 and 34 points with at least 5 in each section
For 2 credits significantly beyond best practice should be achieved scoring 35 points or above with at least 7 in each section.

Evidence Overview
DS - A letter of intent
PCS - CCS Certificate and final monitors report

MAN 3	Mandatory element	Credits available	Credits achieved
Construction Site Impacts	None	2	2

Credits are awarded for promotion of mitigation of site environmental impacts.

Procedures that cover 4 out of 6 of the following are required:

- Monitor, report and set targets for site related transport
- Monitor, report and set targets for CO2 use from site activities
- Monitor, report and set targets for water consumption from site activities
- Adopt best practice policies in respect to air (dust) pollution arising from site activities
- Adopt best practice policies in respect to water (ground and surface) pollution occurring from site
- 80% of site timber is reclaimed, reused, or responsibly sourced

More detailed information can be found in checklist MAN 3 sections c-f, this should be completed. Please note that this is an ongoing credit and must be implemented on site. Please note that although targets must be set, credits will **not** be lost for not achieving them.

For PCS, documentary evidence demonstrating that the procedures detailed in Checklist MAN3 have been achieved which could include the use of:

- Measurement/consumption records
- Target Records
- Graphs comparing consumption with target
- Delivery Records
- Site Procedures for minimising air/dust and water pollution
- CoC certificates for timber or a letter confirming materials used on site were reused

Evidence Overview
DS - Completed MAN3 checklist
PCS - **Records demonstrating criteria**

MAN 4	Mandatory element	Credits available	Credits achieved
Secured by Design	None	2	2

Credits are awarded for design to Secured by Design (SBD) criteria.

To achieve credits, a commitment to follow any advice given by the ALO/CPDA must be made. At PCS evidence should be provided that any recommendations have been followed, however this is not required if a full SBD certificate has been obtained.

Evidence Overview
DS - Letter of Intent and communication with ALO/CPDA
PCS - Full SBD Certificate

ECO 1	Mandatory element	Credits available	Credits achieved
Ecological Value of Site	None	1	1

Credits are awarded for building on sites that do not have any ecological features.

Credit is assumed as the sites consist of hard standing or existing buildings.

Evidence Overview
DS - Site Analysis showing site as existing
PCS - as per DS

ECO 2	Mandatory element	Credits available	Credits achieved
Ecological Enhancement	None	1	0

Credits are awarded for following advice given by an ecologist in respect to ecological enhancement of the site.

An ecologist must be taken on board to recommend ecological enhancements.
All key recommendations and 30% of additional recommendations must be followed.

This credit is available should an ecologist be taken on board.

Evidence Overview
DS - Ecologist Report & Landscaping Plan
PCS - as per DS

ECO 3	Mandatory element	Credits available	Credits achieved
Protection of Ecological Features	None	1	1

Credits are awarded for protection of ecological features under ECO 1 during build process.

This credit is assumed not achieved if ecological features are removed or damaged. Should ecological features be protected then 1 credit is available.
Where site is of low ecological value, this credit is awarded by default.

Evidence Overview
DS - Site Analysis showing site as existing
PCS - as per DS

ECO 4	Mandatory element	Credits available	Credits achieved
Change of Ecological Value	None	4	2

Credits are awarded for improvement of the ecological value of the site.

Drawings clearly showing natural and built features pre-development are required along with drawings post development.

A neutral change can be verified by the assessor to achieve 2 credits, as the sites consist of hardstanding and existing buildings this is readily achieved
An ecologist must be taken on board to advice ecology required to achieve 3 credits or above. Where green roofs are provided additional credit may be available if an ecologist is taken on board.

Evidence Overview
DS - Layout site Plans
PCS - As per DS

ECO 5	Mandatory element	Credits available	Credits achieved
Building Footprint	None	2	0

Credits are awarded for efficient use of land.

1 credits are available for footprint to floor area ratio above 2.5:1 for houses and 3:1 for flats. The scheme does not achieve these minimum requirements.

Evidence Overview
DS - Floor Plans
PCS - As per DS

Appendix A
Results from Pre-Assessment Tools

breglobal

Results

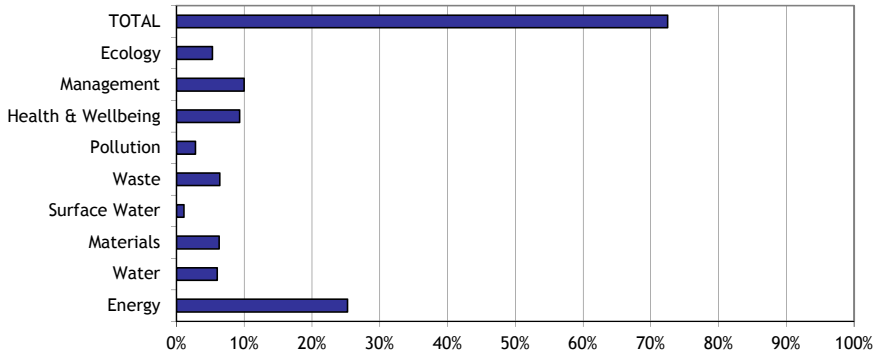
Development Name:	Barington and Lamble
Dwelling Description:	New Build Dwellings
Name of Company:	Ingleton Wood LLP
Code Assessor's Name:	Jason Page
Company Address:	874 The Crescent Colchester Business Park Colchester CO4 9YQ
Notes/Comments:	Site 1&3 Code Level 4

PREDICTED RATING - CODE LEVEL: 4

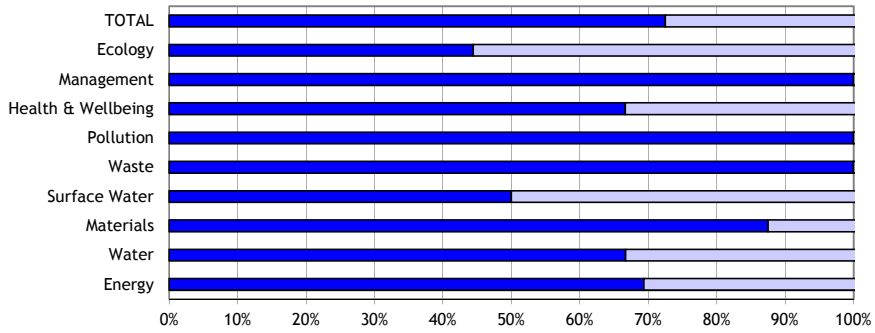
Mandatory Requirements: **All Levels**

% Points:	**72.50%**	**- Code Level: 4**
Breakdown:	**Energy**	**- Code Level: 4**
	Water	**- Code Level: 4**

Graph 1: Predicted contribution of individual sections to the total score and percentage of total achievable score



Graph 2: Predicted percentage of credits achievable: Total and by Category



NOTE: The rating obtained by using this Pre Assessment Estimator is for guidance only. Predicted ratings may differ from those obtained through a formal assessment, which must be carried out by a licensed Code assessor.

breglobal

Results

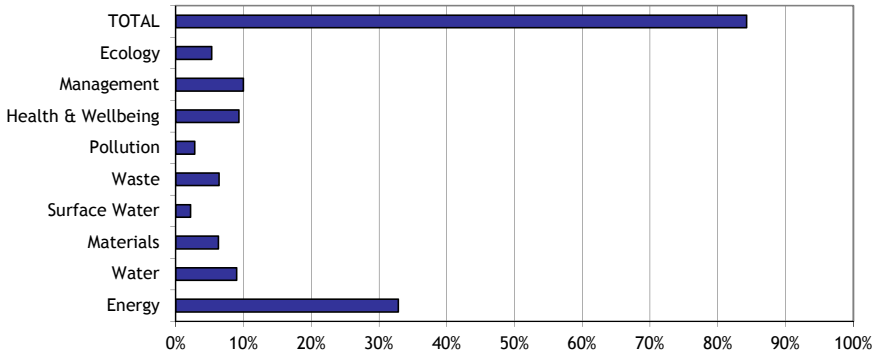
Development Name:	Barington and Lamble
Dwelling Description:	New Build Dwellings
Name of Company:	Ingleton Wood LLP
Code Assessor's Name:	Jason Page
Company Address:	874 The Crescent Colchester Business Park Colchester CO4 9YQ
Notes/Comments:	Site 1&3 Code Level 5

PREDICTED RATING - CODE LEVEL: 5

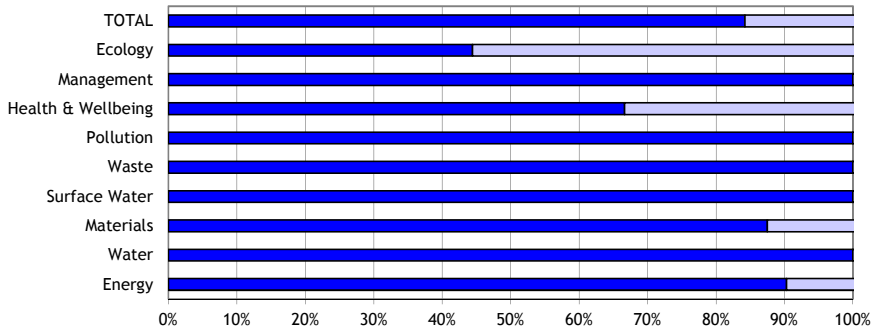
Mandatory Requirements: **All Levels**

% Points:	**84.23%**	**- Code Level: 5**
Breakdown:	**Energy**	**- Code Level: 5**
	Water	**- Code Level: 6**

Graph 1: Predicted contribution of individual sections to the total score and percentage of total achievable score



Graph 2: Predicted percentage of credits achievable: Total and by Category



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breglobal

Results

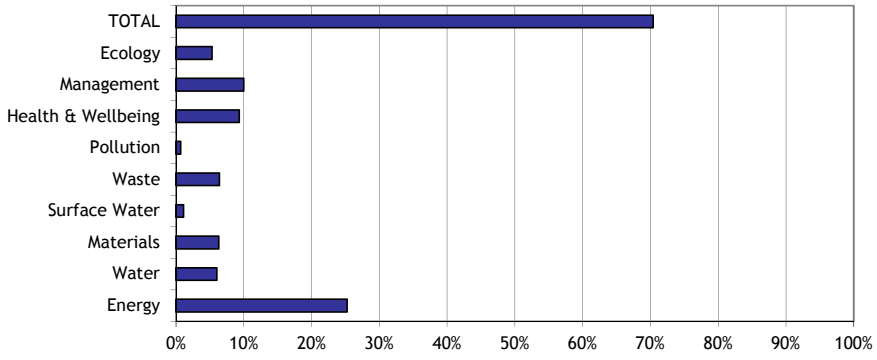
Development Name:	Barington and Lamble
Dwelling Description:	New Build Dwellings
Name of Company:	Ingleton Wood LLP
Code Assessor's Name:	Jason Page
Company Address:	874 The Crescent Colchester Business Park Colchester CO4 9YQ
Notes/Comments:	Site 2 Code Level 4

PREDICTED RATING - CODE LEVEL: 4

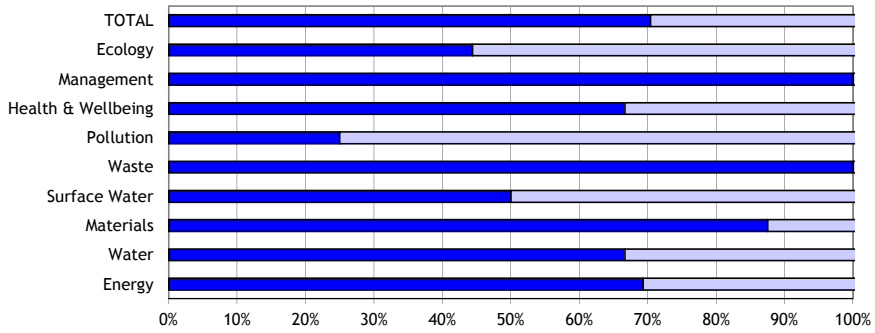
Mandatory Requirements: **All Levels**

% Points:	**70.40%**	**- Code Level: 4**
Breakdown:	**Energy**	**- Code Level: 4**
	Water	**- Code Level: 4**

Graph 1: Predicted contribution of individual sections to the total score and percentage of total achievable score



Graph 2: Predicted percentage of credits achievable: Total and by Category



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