154 Loudoun Road

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154 Loudoun Road Development
Sustainability Statement & Energy Report

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1. Introduction & Approach to sustainability

This report sets out how all dwellings at 154 Loudoun Road will exceed minimum Code for Sustainable Homes Level 3 standards, and how we propose to increase CO2 savings on site through significantly increasing the energy efficiency of the dwellings to Passiv Haus standards as well as committing to further increased levels of energy efficiency, water reduction and choice of materials with low embodied energy under the Code.

The development consists of 42 units of different size and orientation from 1B2P to 4B7P, totalling 3000m2 of dwelling floor area. As this is a feasibility study only the worst case has been considered, as this would represent the highest energy need for space heating. As such, the first floor 2B3P unit has been evaluated because it mainly faces north and has the higher rate of exposed external walls and overshadowing. While most of the units have a southern aspect and hence solar gain (free heat) will be higher, care will then be taken to avoid summer overheating through overhanging balconies or solar shading elements.

The initial design strategy follows the hierarchical approach proposed by Government consultation and the GLA London Plan. It has been calculated that further substantial energy saving and carbon reductions can be achieved by building the development to PassivHaus (PH) standards. PassivHaus refers to the modification of the building envelope to reduce the space heating demand, which typically account for 53% of the carbon emissions from houses (source: GLA. 2007.Mayor's Climate Change Action Plan in Housing in London. November 2008). Although it can be argued PassivHaus is a sophisticated design tool to achieve a high standard dwelling performance, it does not consider environmental impact of materials, water use and ecology for example, which are incorporated in the Code for Sustainable Homes(CSH), which is also reviewed in this initial report.

It is therefore proposed that PH and CSH will be used as integrated tools to meet and for this development to exceed Level 3 of the Code and push the dwelling performance even further to achieve 50% reduction in the following categories: Energy, Water and Materials.

NOTE: This document is produced solely as a design guide and is intended as an illustration of the energy and sustainability aspirations particular to the scheme. A full detail assessment will need to be carried out by qualified assessors at later stages.

2. Code for Sustainable Homes – Pre-assessment Summary

The Code for Sustainable Homes is an environmental assessment method for new dwellings against a set of criteria under nine categories. The Code awards a rating to each dwelling type within the development based on a scale of Level 1 to 6. The rating depends on whether the dwelling meets a set of mandatory standards for each level, as well as an overall score. To meet Code level 3, a total score of minimum 57 is required.

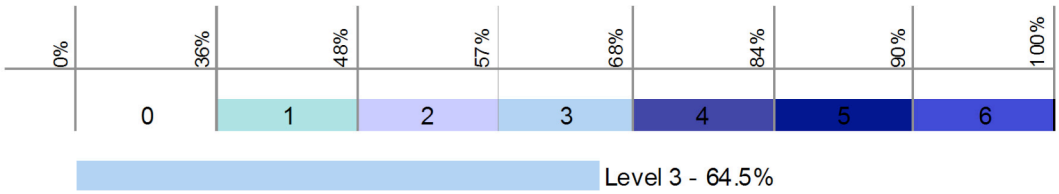
Level **1**	Total **36** points	(min 1.3 from Energy and 1.5 from Water)
Level **2**	Total **48** points	(min 3.8 from Energy and 1.5 from Water)
Level **3**	Total **57** points	(min 6.3 from Energy and 4.5 from Water)
Level **4**	Total **68** points	(min 10 from Energy and 4.5 from Water)
Level **5**	Total **84** points	(min 17.6 from Energy and 7.5 from Water)
Level **6**	Total **90** points	(min 18.8 from Energy and 7.5 from Water)

The aim for 154 Loudoun road is to meet Code Level 3+ with minimum 50% energy, water and materials credits (so above Code Level 3 in these three categories, as illustrated below).

Level **3** Total **57** points (min 15/29 from Energy and 4.5/6 from Water and minimum 12/24 for Materials)

A full pre-assessment has been included in the appendix section.

In summary, by focusing on energy/water and material credits, our aim of achieving Code Level 3+ has been achieved and demonstrated with a total of 64.5 credits, which is nearly Code Level 4 as the bar chart below indicates. (min 57 for Level 3 required)



The table below clearly indicates that we are meeting over 60% of the water and energy credits.

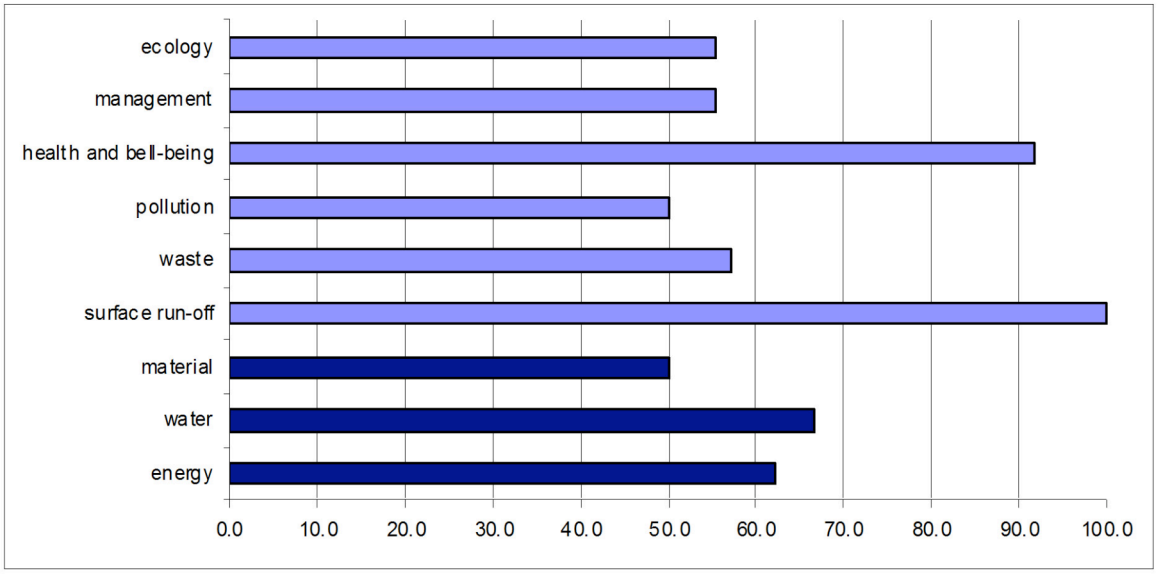


Table 1: Predicted percentage of the total score achievable for each category – full breakdown in category

Energy section: CSH Level 5 standards

For the energy section on its own, the development achieves 18 credits, which is over the minimum entry requirement for Code Level 5 for the energy section. We achieve this through high focusing on the energy hierarchy with high levels of energy efficiency and insulation such as building to PH standards.

3. Hierarchical approach

In accordance with the Government's latest guidelines to meet Zero Carbon Homes, a hierarchical approach has been followed, which also closely relates to the GLA London Plan. The triangle in Figure 1 shows the three steps to complete this requirement.

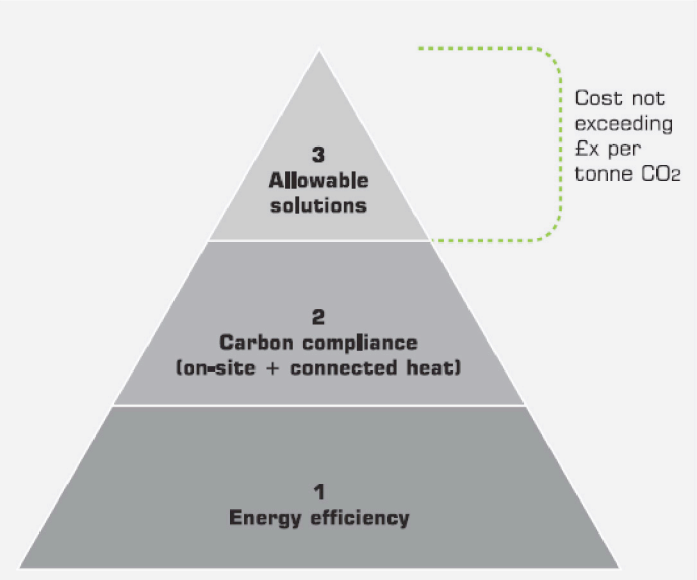


Figure : hierarchical triangle showing the three-tiered approach to reach ZC (source: Zero Carbon Hub, 2009[1])

3.a. Energy Efficiency

The first step is the energy efficiency of the dwelling. Energy efficiency has been achieved through the use of materials to have a high efficiency envelope to minimise heat losses and heat demand. Highly insulated floors, wall and roofs are part of the strategy to delivery high energy efficient standards which will comprise also installation of high efficiency windows, MHVR with 85% heat recovery efficiency, very low air leakage rates and minimisation of thermal bridges become crucial to achieve the high standards of air tightness. As stated in the preceding section, this leads us to achieve CSH

Level 5 in the energy section alone.

1 Zero Carbon Hub, 2009. Defining Zero Carbon Homes 'Have Your Say' Report 2009. Available at: www.zerocarbonhub.org

TABLE 1 REFERENCE VALUES USED IN SAP 2005	
ELEMENT	REFERENCE VALUE
Wall	0.35 W/m²K
Floor	0.25 W/m²K
Roof	0.16 W/m²K
Windows, roof windows, rooflights & doors	2.0 W/m²K
Air permeability (Air tightness)	10 m³ (h.m²) @ 50 Pa

Figure : reference value used in SAP 2005 for notional building

Further energy efficiency measures are also directly demanded in the CSH Energy Requirements in the subcategories called ENE 3 (Internal lighting), ENE 5 (Energy Labelled white goods), ENE 6 (External lighting).

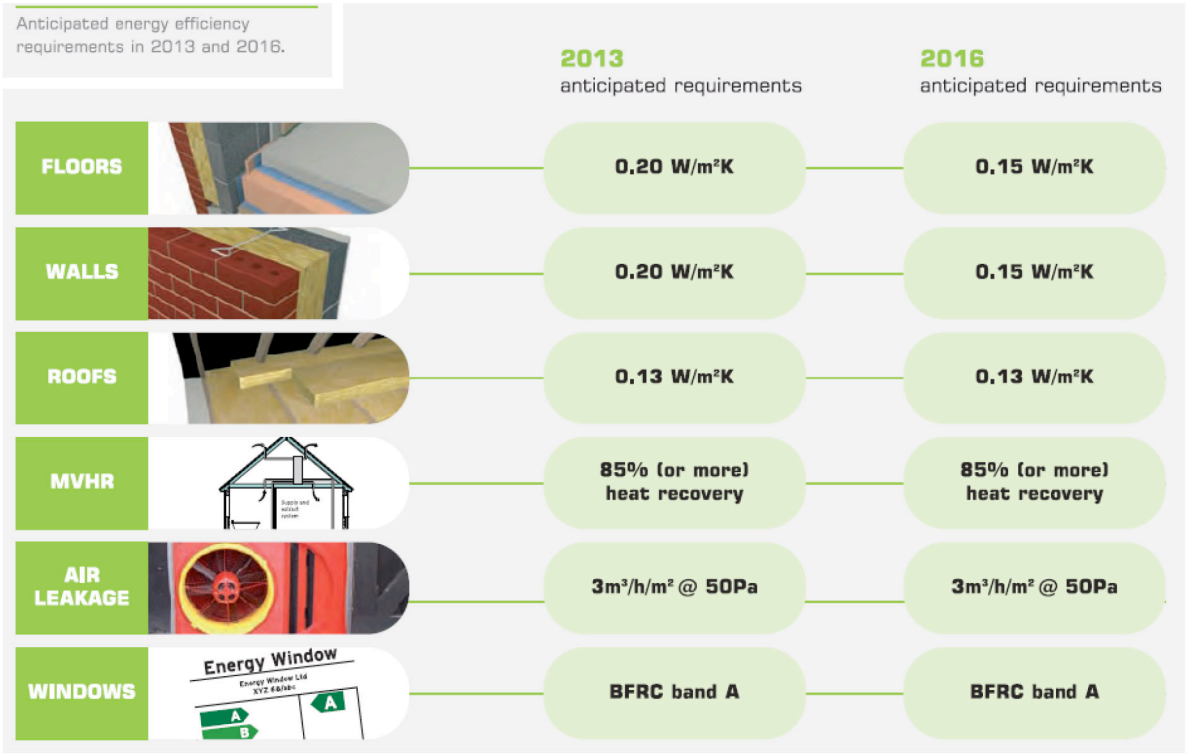


Figure : Energy Efficiency requirements for 2016 (source: Zero Carbon Hub, 2009[2])

TER & DER

Code Level	Minimum Percentage reduction in DER over	Maximum Potable Water Consumption in litres

2 Zero Carbon Hub, 2009. Defining Zero Carbon Homes 'Have Your Say' Report 2009. Available at: www.zerocarbonhub.org

	TER [%]	per person per day
Level 1	10	120
Level 2	18	120
Level 3	25	105
Level 4	44	105
Level 5	100	80
Level 6	'Zero Carbon' Home	80

Table 2: minimum requirements of CSH

To reach CSH Level 3, a reduction of 25% over the TER (Target Emission Rate) has to be achieved. The TER has been calculated based on a notional building of the same size and shape as the actual dwelling and using reference values and fuel factors given in Part L – shown in Table 1. The notional building heat requirement is 65 kWh/m2y (for a typical unit of 67 m2, this is about 4500 kWh/y).

The TER requirement under the current Part L is to achieve a 20% improvement on the notional building (52 kWh/m2y).

However, the aim is to achieve minimum CSH Level 3 with 50% of the energy credits awarded. This means a reduction of at least 25% and the DER (Dwelling Emission Rate) for the unit is therefore **estimated to be 39 kWh/m2y.**

3.b. Carbon Compliance

The second step of the three-tiered approach considers a combination of Energy Efficiency, community heat(CHP for example) and on site Low or Zero Carbon (LZC) technologies.

The GLA's London Plan requires a 20% reduction in carbon emissions as a result of using LZC technologies.

To be able to calculate this reduction, we first need to estimate the total energy requirement for the whole development. This is done in the following section.

4. Estimated Energy Needs

To evaluate how to meet the 20% CO@ reduction target through Low and Zero Carbon(LZC) energy Technologies, we first need to estimate the development's total energy needs, which includes hot water and space heating as well as all electrical demands.

4.a. ELECTRICITY ESTIMATE:

For this dwelling type, an assumption of 40kWh/m2/year is made, which is a typical usage pattern.[3] This means that for the whole 3000 m2 development, the carbon intensity is approximately : **51,600kg CO2/year**

3000 m2x 40kWh/m2/y = 120,000 kWh/y x 0.43kgCO2/kWh. [4]**= 51,600kg CO2/year**

4. b. HOT WATER ESTIMATE

3 . based on average 3000kWh per 4 person household per year – source: 40% House, p 52

4 . Carbon intensity for electricity is 0.43kg CO2/kWh

For this dwelling type, an assumption of 50kWh/m2/year is made, which is a typical usage pattern.[5] This means that for the whole 3000 m2 development, the carbon intensity is approximately : **28,500kg CO2/year**

3000 m2x 50kWh/m2/y = 150,000 kWh/y x 0.19kgCO2/kWh. [6]**= 28,500kg CO2/year**

4.c. SPACE HEATING ESTIMATE

It has been assumed all the heat would be provided by natural gas[7] (emission factor = 0.19 kg CO2/kWh). As previously established in point 3.a. Above, to meet CSH Level 3, the space heating is around 39 kWh/m2y. For the whole development this then equates to 117,200kWh/yr.

The total amount of carbon dioxide emitted has therefore been calculated as 7.41 kgCO2/m2/y **or 22,280 kg CO2/yr for space heating for the entire 3000 m2 development.**

SUMMARY:

A total of 387,200 kWh/year of energy is required with an associated CO2 impact of 102,330kgCO2/yr.

The London Plan requires a 20% CO2 reduction from onsite Low or Zero Carbon Technologies. For 154 Loudoun Road, this would require a reduction of 20,466 kgCO2/year.

The Following section will investigate the proposed strategies for achieving this.

5. 20 % Low and Zero Carbon(LZC) energy strategy

5.1. CHP Feasibility (to provide electricity and Heat)

CHP plants are good for mixed use schemes, which run at least 4000 to 6000 hours per year (15/17 hrs per day)and which have a year round high demand for heating. (such as swimming pools and leisure centres). As the proposed scheme is small in scale, not very mixed use and well insulated hence the heat demand is reduced, CHP is not viable.

5.2. Passiv Haus and Solar Hot Water Proposed strategy

The site is small and a limited number of units are proposed(around 40), but we do have up to 200 m2 usable and non-overshadowed roofspace for any rooftop renewable potential.

It is therefore proposed to utilise Solar Hot Water panels or evacuated tubes on this top roof area in addition to pushing the passive design of the envelope to its maximum.

As a result, the development will provide a CO2 reduction of 16% from increasing the built

5 . based on average 3000kWh per 4 person household per year – source: 40% House, p 41

6 . Carbon intensity for electricity is 0.19kg CO2/kWh

7 Electrical powered space heating would lead to even higher carbon emissions, and has not been considered

standard from CSH Level 3 to Passiv Haus standard. An additional 6% CO2 reduction is achieved by providing 20% of the total estimated yearly hot water demand through solar hot water panels/tubes on the roof. This would lead to a total CO2 reduction of 22,800kgCO2 or a total 22% CO2 reduction.

Solar Hot water

Solar hot water panels are 3 to 5 times more efficient than PV's per m2. They produce hot water for domestic consumption (DHW). To meet the 20% proposed hot water provision on site, approximately 100 m2 of Solar Hot water Flat plate collectors are required or 60m2 of evacuated tubes.

Evacuated tubes are more efficient than flat plates and can be positioned flat on the roof. Flat plates need to be angled at approx. a 30-40 degree angle on the roof.

Other design considerations:

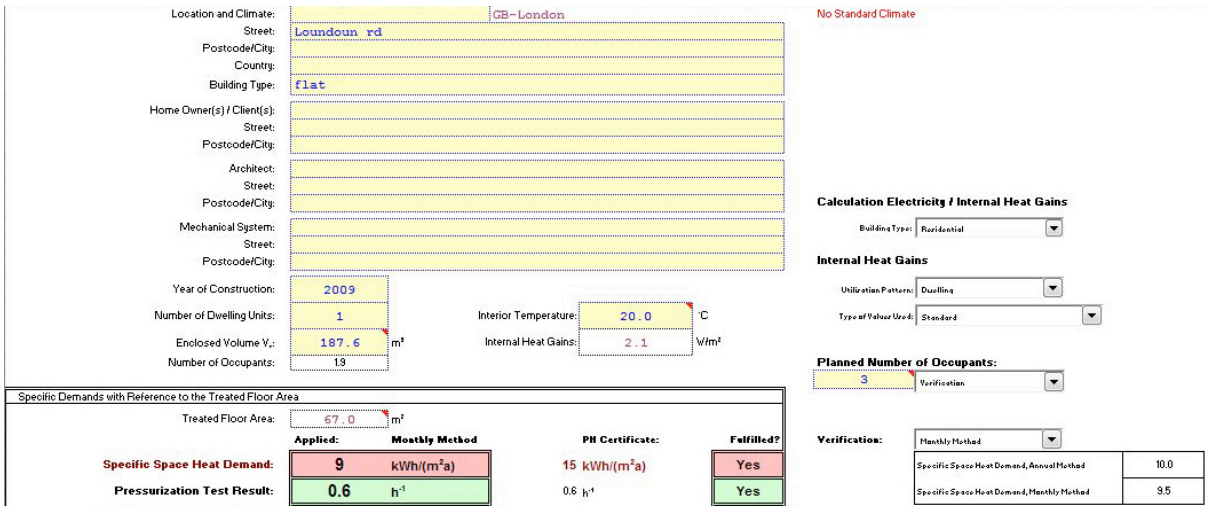
- Sufficient roof area has been identified to meet this 20% hot water provision for both flat plate collectors and evacuated tubes. The roof of the highest block will provide all of the panels, and a thermal water storage tank is to be located in the ground floor plant room. The top, non-overshadowed roof is around 300m2, however not all could be utilised as copings will throw shadow in the panels and for Health and Safety reasons, pathways of around 1 meter need to be provided around the centre panel location to allow for future maintenance. Hence it is thought that an absolute maximum of 200 m2 is available for any solar panels, not allowing for any spacing in between the panels etc.(which may reduce this area slightly further)
- Around 20m2 plant room to accommodate thermal store are considered on the ground floor.
- If all dwellings are served by electrical cookers, no main gas connection or pipework is required to each individual unit.
- Each unit can be monitored for hot water usage and the landlord can provide reduced bills to the residents or use a standard competitive rate and get a payback on the initial capital investment.

PassivHaus

It is calculated with the Passiv Haus Planning Package Software(PHPP), that given the increased insulation levels to comply with PassivHaus standards, combined with an energy efficient Heat Recovery Ventilation System, that the average space heat demand can be reduced to 9 kWh/m2/year.

As discussed in section 3.a, page 5, this compares to a Code Level 3 space heat demand of 39kWh/m2/year; effectively reducing the space heat demand for the whole development from approximately 117,000 kWh/yr to 27,000 kWh/yr. This effectively has reduced the space heat demand by 75%, also offering residents a significant energy cost saving.

(See software modelling summary below).



	Characteristics	R= 1/U-value	space heat demand	Kg CO2 saved compared to Code Level 3
1	Glass mineral wool insulation (Saint-Gobain Isover) Double low-e 4/16Argon90%/4 Epsilon=0.04	R=0.033 W/mK U-value=1.1 W/m2K	9 kWh/m2y	280 kg C02/y
2	rigid urethane (kingspan Thermawall TW50) Double low-e 4/16Argon90%/4 Epsilon=0.04 U-	R=0.022 W/mK U-value=1.1 W/m2K	7 kWh/m2y	308 kg C02/y
3	Glass mineral wool insulation (Saint-Gobain Isover)	R=0.033 W/mK U-value=2 W/m2K	15 kWh/m2y	206 kg C02/y
4	Rigid urethane (kingspan Thermawall TW50) Triple glazing 4/10 air/4/10 air/4	R=0.022 W/mK U-value=2 W/m2K	13 kWh/m2y	kg C02/y

Table 3: different scenarios and results of PassivHaus design, depending on the characteristics of the materials (insulation and window)

6. Energy Summary

Pushing the energy efficiency of the envelope to the absolute maximum is the 'first renewable' and essential to build a more sustainable future.

In this report, we have shown and quantified the impact that increasing the building envelope to Passiv Haus standards can have in reducing energy bills and the environmental cost: 75% of the energy needed to heat spaces will never be required in the first place.

In addition, building to PH standards contributes to a CO2 saving of 16% of the entire development. It is then argued that the most feasible way to meet the remaining 4% CO2 reduction is through Solar hot water panels or evacuated tubes, which would provide 20% of the development's hot water requirements throughout the year and increase the development's total CO2 savings to 22%.

Clearly, both measures will significantly reduce the development's running costs (leading to lower bills for residents and higher thermal comfort), as well as providing a robust strategy for CO2 savings now and in the future: our strategy relies mainly on passive measures, and requires low maintenance or future replacement of expensive kit. The building envelope alone provides a 16% CO2 saving each and every year or the lifetime of the building.

7. Appendix

7.1. Code Pre-assessment Breakdown.

7.2. Windows

To comply with first step of the hierarchical approach: energy efficiency, the developments will be equipped with high standard windows. The thermal efficiency of windows is evaluated with the U-value of the glazing and frame, and the thermal bridges figures of the frame.

Low U-values implies higher efficiency, although triple glazing normally perform better than double glazing, some type of double glazing with high-transmission value, Low-Emittance glass and argon gas fill perform better than triple glazing for their high solar heat gain transmittance, this characteristic make them the product of choice for passive solar design projects8

High solar gain Low-E glass products are best suited for buildings located in heating-dominated climates.

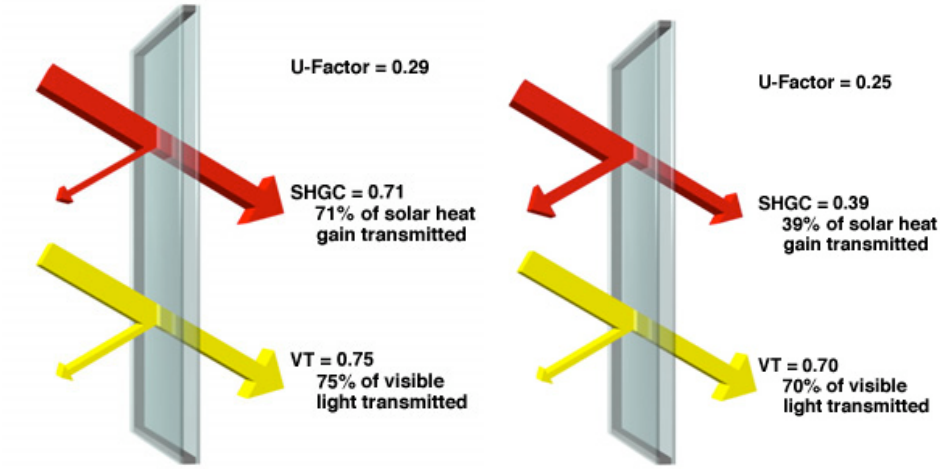


Figure 0.1: comparison between Low-Solar-Gain (right) and Low-Solar-Gain (left) Low-E Glass

8 Source: http://www.efficientwindows.org/lowe.cfm

7.3. Water usage

Water usage calculation according to CSH

			installation	use / person / day	use factor	No. Within dwelling
wc	dual flush	full flush	4	4.8	0.33	1
		part flush	2.5	4.8	0.67	1
			consumption / person / day (litres)			14.38
bidet			0	2	1	0
			consumption / person / day (litres)			0
wash hand basin tap			flow rate (l/min)			
			1.7	7.9	0.67	1
			consumption / person / day (litres)			8.98
shower			flow rate (l/min)			
			8	0.6	5	1
			consumption / person / day (litres)			24
			capacity to overflow (litres)			
bath			140	0.4	0.4	1
			consumption / person / day (litres)			22.4
kitchen sink taps			flow rate (l/min)			
			2.4	7.9	0.67	1
			consumption / person / day (litres)			12.7
white goods	washing machine		49	0.34	1	1
	actual(litres/cycle)					
	dishwasher		13	0.3	1	1
	actual(litres/cycle)					
			consumption / person / day (litres)			20.56
					TOT	**103.04**

7.4. Materials

1) Insulation

Material	Embodied Energy	R = 1/U-value	GWP	NOx
Glass mineral wool insulation (Saint-Gobain Isover)	achieves an A+ rating under the BRE Green Guide	**0.033 W/m K**	less than 5	Not stated**
Rigid urethane (kingspan Thermawall TW50)	A rating under the BRE Green Guide	**0.022**	CFC/HCFC-free	-

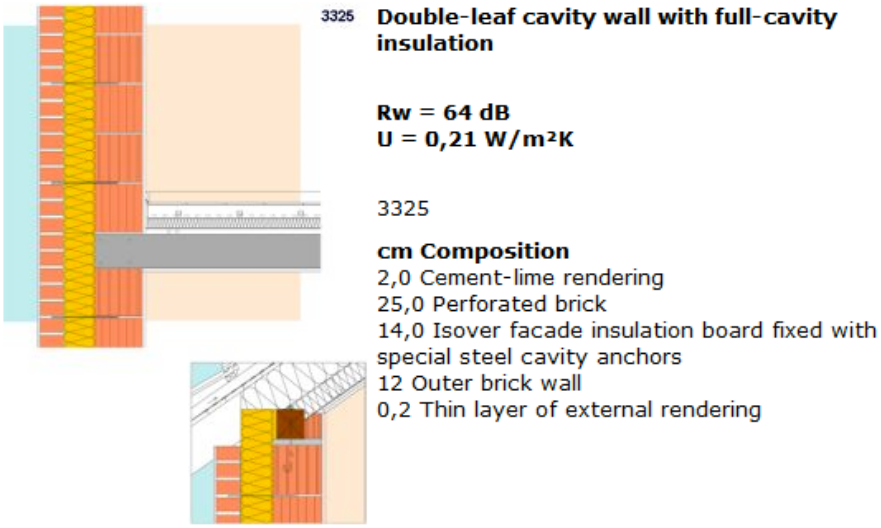


Figure 0.2: isover insulation characteristics (source: http://www.isover.co.uk/article.asp?id=297)

** http://www.isover.com/Our-commitment-to-sustainability/Our-contribution/Our-environmental-policy

2) Gypsum block

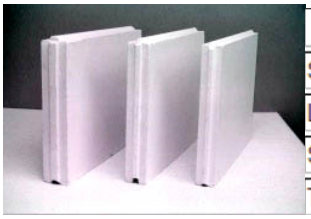
Promonta Gypsum block

Smooth surface of the Promonta blocks makes plastering unnecessary. With their acoustic insulation, they have pronounced noise-dampening properties. The thermal insulation affect of Promonta blocks produces high-energy savings. Promonta is part of NBS group, based in the UK.

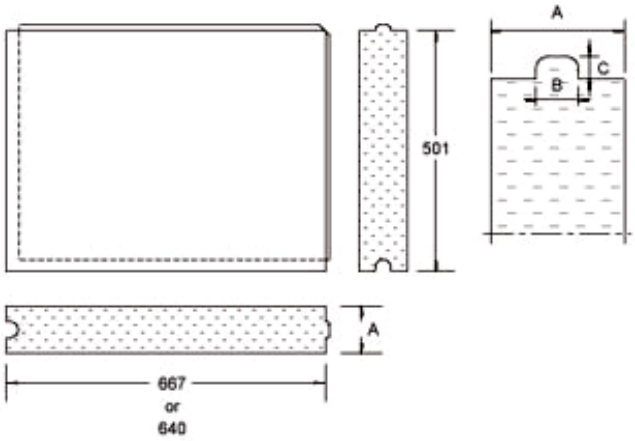
Whit these particular blocks it is possible to achieve high airtight standards thanks to their shape (see figure below), their installation and finishing is easy and quicker than any other block type. Furthermore gypsum embodied energy is lower than concrete and aircrete block.

General Description - Non-load bearing internal wall partition blocks consisting of solid gypsum with a tongue and groove connection.

Form & Construction - Rectangular, flat, solid gypsum blocks made from high-quality gypsum, water and supplementary ingredients.



Sizes	
Standard formats	501x667mm (3No. per m2)
Lightweight blocks	501x640mm & 501x450mm
Small sized blocks	501x450mm
Thickness	50, 60, 70, 80 & 100mm



A (mm)	B (mm)	C (mm)
50	15	10
60	20	10
70	22	12
80	26	15
100	34	14

Figure 0.3: source: http://www.nbsgroup.com/products/promonta.html

ENERGY

To limit emissions of carbon dioxide (CO) into the atmosphere that arises from the operation of the dwelling and its services. To future proof the energy efficiency of dwellings over their whole life by limiting heat losses across the building envelope. To encourage the provision of energy efficient internal lighting, thus reducing the CO2 emissions from the dwelling. To encourage provision of energy efficient white goods, and so reduce the CO2 emissions from appliances in the dwelling and efficient external lighting, and reduce associated CO2 emissions.

Credit Summary		Credits Available	Credits Scored	% Achieved	
ENERGY					
Ene 1	Dwelling Emission Rate	15	8		*Mandatory: 25% improvements of DER over TER,* through PassivHaus design
Ene 2	Building Fabric	2	1		Heat Loss Parameter (HLP, should be calculated with SAP2005) = less or equal to 1.3
Ene 3	Internal Lighting	2	2		provision of fixed dedicated energy efficient internal light = greater than or equal to 75%
Ene 4	Drying Space	1	0		There is no drying space
Ene 5	Energy Labelled White Goods	2	2		White goods are provided with EU Energy Labelling Information (fridges and freezers are A+ rated and washing machine/dishwasher are A rated, and B rated drier)
Ene 6	External Lighting	2	2		External space lighting are provided Code compliant, with dedicated low energy fittings and appropriate control, Same for Security lighting (provided Code compliant)
Ene 7	Low Zero Carbon Technologies	2	2		20% reduction from Low or Zero Carbon Technologies: roof mounted solar Hot Water Panel will be integrated to provide DHW
Ene 8	Cycle Storage	2	1		Cycle storage: space for 1 cycle every unit
Ene 9	Home Office	1	0		There is no Home Office
	Total	29	18	62.1	

Comment:

- 49% improvement has been achieved using high level of insulation and PassivHaus design as explained in Hierarchical approach
- 20% on site reduction through renewable will be achieved installing Hot Water solar Panel
- Internal lighting are low energy; lighting accounts for around 10-15 per cent of an electricity bill, compact fluorescent light bulbs (CFLs) use around 60 per cent less electricity than traditional incandescent lights, while lasting ten to twelve times as long.
- External lighting and security lighting are energy efficient and adequately controlled to minimise energy consumption.
- Home office reduces the need to commute to work by providing residents with the necessary space and services to be able to work from home (credit not sought)

WATER

To reduce the consumption of potable water in the home

	Credit Summary		Credits Available	Credits Scored	% Achieved	
WATER						
Wat 1	Indoor Potable Water Use		5	3		Each unit will achieve a water consumption rate of less than 105 litres/person/day (see table below for further details)
Wat 2	External Water Use		1	1		External water use with collection system
		Total	6	4	66.7	

Comments:

- To achieve internal potable water usage low flush toilet with double flush, low flow shower, flow regulated taps, low capacity bath and low water use appliances will be installed.
- Water consumption has been calculated considering the following capacity or flow rate, where Use factor, number of use per person per day and proportion within the dwelling have been input according to the CSH calculation spreadsheet (see Table in Appendix B) :
    - 1 WC will have a dual flush (full flush = 6 l/flush, part flush = 2.6 l/flush)
    - 1 Wash hand and basin tap with flow rate = 1.7 l/min
    - 1 Shower with flow rate = 8 l/min
    - 1 Bath with capacity to overflow of 140 litres
    - 1 Kitchen sink with flow rate = 2.4 l/min
    - Washing machine using 49 litres/cycle
    - Dishwasher using 13 litres/cycle.
- A rainwater collecting system for use in irrigation is provided

MATERIALS

To encourage the use of materials with lower environmental impacts over their lifecycle.

Credit Summary		Credits Available	Credits Scored	% Achieved	
MATERIALS					
Mat 1	Environmental Impact of Materials	15	8		Materials are chosen according to their low embodied energy and location of the manufacturer to minimise transport impact
Mat 2	Responsible Sourcing of Materials – Basic Building Elements	6	3		80% of the assessed materials are responsibly sourced: frame, ground floor, upper floors, roof, external walls, internal walls, foundations, staircase; 100% of any timber in these elements is legally sourced
Mat 3	Responsible Sourcing of Materials – Finishing Elements	3	1		80% of the assessed materials are responsibly sourced: stair, window, external and internal door, skirting, panelling, furniture; 100% of any timber in these elements is legally sourced
	Total	24	12	50.0	

Comments:

- Standard Brick have embodied energy from4.5 to 11.7 MJ/kg (0.3-1.4 kg CO2/kg)
- Glass mineral wool insulation A+ rated according to BRE Green Guide (see Appendix B for further details)
- Gypsum block: whit no need of plastering and high airtightness performance,
- Gypsum embodied energy is lower than concrete and aircrete block
- Plastering will not be needed, thus maintaining the thermal mass property of massive external walls, very important especially in PassivHaus design (if plastering will be considered necessary wet plaster performs better for air infiltration and can be used to achieve high thermal mass, we lose the thermal mass of the concrete blocks if covered by plasterboards).
- Steel to be used as structural elements of external walls for balconies will be recycled to lower its embodied energy

SURFACE WATER RUN-OFF

To design housing developments which avoid, reduce and delay the discharge of rainfall to public sewers and watercourses. This will protect watercourses and reduce the risk of localised flooding, pollution and other environmental damage.

Credit Summary		Credits Available	Credits Scored	% Achieved	
SURFACE WATER RUN-OFF					
Sur 1	Management of surface water run-off from developments	2	2		Credits are awarded where rainwater run-off is attenuated. Ensure that the peak rate of runoff into watercourses is no greater for the developed site than it was for the pre-development site. No attenuations are provided for either Hard surface and roof.
Sur 2	Flood Risk	2	2		The development is located in an area of low annual probability of flooding
	Total	4	4	100	

Comments:

- It is mandatory at all levels to ensure that the peak rate of run-off into watercourses is no greater for the developed site than it was for the pre-development site.
- Credits will be sought as attenuation measures of water run-off from the roof (i.e. green or brown roof) and hard landscaping were designed
- Currently the hard surface does not provide any surface run-off attenuation, about 250 squared meter of permeable surface (garden) will be added to the site.
- The risk of flooding on Loudoun road has been checked, the Flood Risk Assessment (FRA) accompanying the planning application demonstrates the satisfaction of the local planning authority and statutory body that the development has a low risk of flooding from all sources.

WASTE

To recognise and reward the provision of adequate indoor or outdoor storage space for non-recyclable waste and recyclable household waste. To promote reduction and effective management of construction related waste by improving on performance which meets the Site Waste Management Plan (SWMP) regulations.

	Credit Summary	Credits Available	Credits Scored	% Achieved	
WASTE					
Was 1	Storage of non-recyclable waste and recyclable household waste	4	4		The non-recyclable waste storage is a mandatory requirement with no available credits. Provision of storage space for household recyclable materials has been considered although the Local Authority Collection Scheme
Was 2	Construction Site Waste Management	2	0		It is mandatory at all levels of the Code for a Site Waste Management Plan (SWMP) to be developed and implemented.
Was 3	Composting	1	0		Home composting facilities are not provided
	Total	7	4	57.1	

Comments:

- A minimum space for storage of non-recyclable waste household waste is provided, Local Authority collection is provided.
- The development costs more than £200K, the Site Waste Management Plan (SWMP) includes monitoring of waste generated on site OR includes targets to promote resource efficiency
- Some composting facilities are provided but only for ground floor units (credit not scored)

POLLUTION

To reduce global warming from blowing agent emissions that arises from the manufacture, installation, use and disposal of foamed thermal and acoustic insulating materials. To reduce NOx emissions arising from the operation of space heating and hot water systems for the development.

Credit Summary		Credits Available	Credits Scored	% Achieved	
POLLUTION					
Pol 1	Global Warming Potential (GWP) of insulants	1	0		Global Warming Potential (GWP) of Insulants: most of the insulants used have a GWP of less than or equal to 5
Pol 2	NOx Emissions	3	2		NOx emissions are less than or equal to 70mg/KWH (see Appendix C for NOx emissions from insulation products)
	Total	4	2	50.0	

Comments:

- Most of the insulating materials in the elements of the dwelling listed below avoid the use of substances that have a GWP less than or equal to 5 (manufacture or installation):
    - Roofs: Including loft access
    - Walls: internal and external including lintels and all acoustic insulation)
    - Floors: (including ground and upper floors)
    - Hot water cylinder, pipe insulation and other thermal stores
    - Cold water storage tanks where provided
    - External doors.
- Nitrogen oxides (NOx) are emitted from the burning of fossil fuels, this scheme considers low NOx systems for Domestic Hot Water and low- NOx boilers as top-up for DHW. The development will be built without the use of fossil fuels to heat the dwellings as it has been designed according to PassivHaus standards, thus NOx emissions will depends only from the use of some electric heater to be used as backup in case of very rigid weather condition.

HEALTH & WELLBEING

To improve the quality of life in homes through: a) good daylighting to reduce the need for energy to light the home, b) sound insulation to reduce the likelihood of noise complaints from neighbours, b) outdoor space which is at least partially private. To encourage the construction of homes that are accessible to everybody and where the layout can easily be adapted to meet the needs of future occupants.

	Credit Summary	Credits Available	Credits Scored	% Achieved	
HEALTH & WELLBEING					
Hea 1	Daylighting	3	2		Daylight Factor (DF): kitchen DF > 2%, Living Room DF > 1.5%
Hea 2	Sound Insulation	4	4		Sound insulation: 8dB
Hea 3	Private Space	1	1		Some outdoor private/semi private space will be provided
Hea 4	Lifetime Homes	4	4		Lifetime homes criteria will be met
	Total	12	11	91.7	

Comments:

- good natural lighting also helps to make a building energy efficient; effective daylighting will reduce the need for electric lighting, while winter solar gain can meet some of the heating requirements
- Sound insulation will be guaranteed by design specifications, Robust Details have been used as an alternative to pre-completion testing for demonstrating compliance with Part E. Robust details have been applied for separating wall and floor constructions.
- Every unit but one (2B3P at first floor) is designed to provide external private space to occupants with balconies.
- More than 1.5 squared meter allowed to each resident as secure private space at the ground floor with a total garden area of about 250m2 outdoor private/semi private space
- All the principles of Lifetime Homes have been complied with.

MANAGEMENT

To recognise and encourage the provision of guidance to enable home owners/occupiers to understand and operate their home efficiently and to make the best use of local facilities. To recognise and encourage construction sites managed in an environmentally and socially considerate and accountable manner. To recognise and encourage construction sites managed in a manner that mitigates environmental impacts. To encourage the design of developments where people feel safe and secure

Credit Summary		Credits Available	Credits Scored	% Achieved	
MANAGEMENT					
Man 1	Home User Guide	3	3		Home user guide comprises operational issues and site and surroundings
Man 2	Considerate Constructors Scheme	2	0		Considerate Constructor's Scheme has not been used
Man 3	Construction Site Impacts	2	0		Construction site impact monitored: CO2/Energy use from Site Activities and Water consumption from Site Activities. Best practice adopted in respect of: Air (dust) pollution from Site Activities, Water Pollution, 80% of site timber is responsible sourced
Man 4	Security	2	2		Security: complying with Section 2 – Physical Security from 'Secured by Design New Homes
	Total	9	5	55.6	

Comments:

- provision of a simple user guide which covers information relevant to the 'non-technical' tenant/owner on the operation and environmental performance of their home
- The design complies with Section 2 – Physical Security from *'Secured by Design New Homes'*. Where an Architectural Liaison Officer (ALO) or Crime Prevention Design Advisor (CPDA) from the local police force is consulted at the design stage and their recommendations are incorporated into the design of the dwelling

ECOLOGY

To enhance the ecological value of a site. To protect existing ecological features from substantial damage during the clearing of the site and the completion of construction works

Credit Summary		Credits Available	Credits Scored	% Achieved	
ENERGY					
Eco 1	Ecological value of site	1	1		The site has low/insignificant Ecological Value
Eco 2	Ecological enhancement	1	0		There is no ecological enhancement
Eco 3	Protection of ecological features	1	1		The site has low/insignificant Ecological Value
Eco 4	Change in ecological value of site	4	3		There is a minor enhancement in ecological value
Eco 5	Building footprint	2	0		Building footprint is not assessed (credit not sought)
	Total	9	5	55.56	

Comments:

- Because the site has low ecological value, confirmed by site visit report from the design team/assessor and photograph
- Plans of the site and surrounding area prior to development will be kept (small strip of green area along the railway).
- Existing features of ecological value on the development site potentially affected by the works, are maintained and adequately protected during site clearance, preparation and construction works.
- Land of ecological value outside the construction zone will be adequately protected during construction works provided by: As Built site plans identifying features present