

**Code for Sustainable Homes (2007)**

**Design Stage Pre Assessment of**

**45 Pilgrim's Lane, London NW3**

**(Design Revision 2)**

**Pre Assessment Report**

**4<sup>th</sup> Feb 2008**

**CODE FOR SUSTAINABLE HOMES**

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## 1.0 Introduction

In order to show environmental performance for planning purposes and a commitment to such issues by the client, an initial Code for Sustainable Homes pre-assessment has been carried out on the design of the Pilgrims Lane development at the request of the client and the Design Team (lead by the Crawford Partnership).

The scheme is a small development on the site of an existing development and consists of 5 flat units. The Code considers each of these units separately, however, since they all are likely to achieve the same (or similar) amount of credits, they have all been considered together as one Code Type for the purposes of this pre-assessment report. Where there may be differences between flats, these issues will be highlighted for future investigation.

This development has been assessed under the Code for Sustainable Homes (2007). The target rating for this development is currently **Level 3**.

## 2.0 Summary

During the pre-assessment exercise, the assessor discussed all of the Code for Sustainable Homes credit criteria with Crawford Partnership. The mandatory requirements and further 'tradable' credits identified as potential targets in this exercise were used to give a pre-assessment score which fell within the '★★★' category.

With the new Code it is important to address key areas of sustainability, namely energy demand (and carbon emissions) and water use. The Design Team are keen to meet the challenge of a 25% reduction in carbon emissions over Building Regulations 2006, and aim to achieve this by an early commitment to design an energy efficient building, paying particular attention to the building fabric and the services e.g. boiler efficiency.

The minimum requirement for internal water use sets a new high standard of water efficiency which the Design Team will address by using low flow/flush fittings where feasible in combination with rainwater harvesting from the roof to service some of the appliances.

The other requirements such as materials specification, waste management and surface run-off are more easily achieved and often exceeded. With the commitments by the Design Team to achieve Code Level 3 (★★★) this demonstrates the desire to achieve standards that in fact go above the old EcoHomes 'VERY GOOD' standard and in many ways approach EcoHomes 'EXCELLENT'.

The details in section 4.0 show how this can be achieved, along with further considerations (section 4.5) for an alternative route, and/or how it would be possible to achieve Code Level 4 (★★★★).





### 3.0 The Code for Sustainable Homes Rating

#### 3.1 Introduction

The Code for Sustainable Homes has been launched on the 10<sup>th</sup> April 2007 by The Government, specifically the Department for Communities and Local Government (DCLG) and is maintained and Quality Assured by the BRE and by its registered assessors. The Code is provided as a measure of future Building Regulations targets driven by increasingly taxing Government and EU targets. The Government will eventually make the current Code requirements mandatory, possibly from as early as April 2008. The Code is measured on star ratings from 1 to 6, 1 being the worst. These correlate to EcoHomes as follows:

Code Level	EcoHomes Rating
★	Pass
★★	Good
★★★	Very Good
★★★★	Excellent
★★★★★	Better than Excellent
★★★★★★	Better than Excellent

This is not a precise correlation. The BRE estimate that the additional build cost of achieving a 3 star rating over an EcoHomes rating of Very Good is approximately £500- £1,500 per dwelling. This is due to mandatory requirements, individual assessments and post construction reviews required under the Code.

#### 3.2 Code for Sustainable Homes versus EcoHomes

The Code is based on the EcoHomes 2006 methodology but with some significant changes. In summary the main changes are:

- The Code assesses each individual dwelling and not the development as a whole. The only exception is where block compliance is sought under Part L1A of the Building Regulations, in which case the energy credit can be assessed based on the whole block.
- All Code assessments will be subject to a post construction review. The BRE will issue an interim design certificate but the final certificate will not be issued until the dwellings are complete and an assessor has confirmed that the criteria have been met.
- There are minimum requirements in energy, water, materials and surface water run-off to achieve specific code levels.
- Energy is now measured as an improvement over Building Regulations Part L1A and the minimum requirements against each code level are as follows:

Code Level	Improvement over Building Regs	Example Standards
★	10%	EST1 Good Practice standards
★★	18%	
★★★	25%	EST Best Practice standard
★★★★	44%	PassivHaus standard/EST exemplary
★★★★★	100%	
★★★★★★	Full Zero Carbon	

1 Energy Saving Trust

<http://www.saveyour20percent.org/housingbuildings/professionals/standards/intro/>

- The water credits have been changed to be assessed as litres/person/day and will include other water using appliances such as bidets and kitchen taps. The proposed minimum requirements are as follows:



Code Level	Water Use (litres/person/day)
★	120
★★	120
★★★	105
★★★★	105
★★★★★	80
★★★★★★	80

- There is also a minimum requirement for materials for at least three of the following key elements of construction are specified to achieve a BRE Green Guide 2006 rating of at least D
  - Roof structure and finishes
  - External walls
  - Upper floor
  - Internal walls
  - Windows and doors
- Materials will be assessed on an area weighted basis against the new Green Guide. A draft new Green Guide should be available to assessors from 10th April 2007 however, it is not due for publication until the Autumn.
- Materials credits are calculated against points for different ratings e.g. a D-rated wall would be calculated on the basis of 0.25 points and weighted by the area.
- The minimum requirement for surface water run-off is to ensure that peak run-off rates and annual volumes of run-off will be no greater than the previous conditions for the development site. For many sites this may require an appropriate consultant.
- There are also minimum requirements for construction site waste management and provision of recycling facilities for each dwelling.
- There are 2 new criteria. There are 4 credits for achieving the Lifetime Homes standard and an additional credit for providing compost bins.
- The sound testing credit now allows for the use of the Robust Standard Details, but does require that the detail has, at some point, been tested to ensure compliance.

### 3.3 Code for Sustainable Homes Scoring

Projects are assessed using a system of credits. These credits are grouped into the following categories:

- Energy
- Water
- Materials
- Surface Water
- Waste
- Pollution
- Health
- Management
- Ecology

In order for a score to give an appropriate balance across such a broad selection of issues, a weighting system has been developed through consultation with a range of industry representatives. This weighting system provides a relative importance to each of the credit categories. The current weightings are as follows:

Category	Weighting for Code
Energy/CO <sub>2</sub>	36.4%



Water	9%
Materials	7.2%
Surface Water	2.2%
Waste	6.4%
Pollution	2.8%
Health	14%
Management	10%
Ecology	12%

The number of environmental criteria within each of the categories varies and as a result, there are a different number of credits within each category. Due to the different number of credits within each category and the differing category weightings, the overall value of each individual credit (as a percentage of the total number of credits in the assessment) is different depending on the category.

The mandatory points (discussed in 3.2 above) can be added to the other 'tradable' points achieved in all the other categories to achieve a total number of points. This can then be used to determine the Code Level that has been achieved. For each level it is necessary to:

- Achieve the all mandatory minimum standards for that level
- Achieve the total tradable points needed for the level (the sum of both extra tradable points achieved for mandatory issues and tradable points for flexible issues)

In order to achieve credits, information must be submitted to the assessor who will then award credits based on the current Code compliance criteria. The weightings are then applied to the sum total for each credit category to achieve an overall score. In the case of a pre-assessment, this is an informal process; for the full assessment, this information needs to be provided in full as confirmation of commitment to achieve each credit. This score is then used to identify the overall Code level rating using the following ranges:

Rating	Code Score
★	36 – 47
★★	48 – 56
★★★	57 – 67
★★★★	68 – 83
★★★★★	84 – 89
★★★★★★	90 – 100

### 3.4 Assessment Procedure

Assessments are carried out to award credits and points (after weighting) based on environmental features of the individual dwelling. These features either refer to:

- Features which the dwelling shares with all other dwellings on the site known as **Site Wide Issues**
- Features which entail access to some common facility shared with a number of other dwellings known as **Shared Issues** (but less than the whole site)
- Features which relate to the performance of the dwelling itself known as **Dwelling Issues**

In order to reduce the number of different assessments, dwellings may be combined together as similar 'Code Dwelling Types'. To be of the same 'Code Dwelling Type' dwellings must have exactly the same set of Code scoring features. Within each category, issues are scored initially as credits. They are then converted through category weightings to percentage scores known as 'Points'.



Some credits are always awarded for the site as a whole, whilst other credits can be awarded either for an individual dwelling or for a site wide approach or for a combination of the two (an example of this would be the provision of renewable energy).

Once the design stage assessment has been carried out, based on information submitted to the assessor, a report is written which describes which credits have been awarded. This report then goes to the BREEAM team at the BRE for QA procedures. If the QA is passed then an interim certificate is issued depending on the rating scale and will result in a building being awarded an 'Interim' Code Level 1 to 6 rating.

The second part is carried out after construction (called the Post Construction Review) –and each 'Dwelling' is given a 'Final' Code certificate at this stage.

The number of environmental credits within each different number of credits within each category. Due to the different number of credits within each category and the different category weightings, the overall value of each individual credit (as a percentage of the total number of credits in the assessment) is different depending on the category.

The mandatory points (discussed in 3.2 above) can be added to the other 'tradeable' points achieved in all the other categories to achieve a total number of points. This can then be used to determine the Code Level that has been achieved. For each level it is necessary to:

- Achieve the all mandatory minimum standards for that level.
- Achieve the total tradeable points needed for the level (the sum of both extra tradeable points achieved for mandatory issues and tradeable points for flexible issues).

In order to achieve credits, information must be submitted to the assessor who will then award credits based on the current Code compliance criteria. The weightings are then applied to the sum total for each credit category to achieve an overall score. In the case of a pre-assessment, this is an informal process for the assessor, the information needs to be provided in full as confirmation of commitment to achieve each credit. This score is then used to identify the overall Code level rating using the following ranges:

Rating	Code Score
★	36 - 47
★★	48 - 55
★★★	56 - 67
★★★★	68 - 83
★★★★★	84 - 99
★★★★★★	100 - 100

## 3.4 Assessment Procedures

Assessments are carried out to award credits and points (after weighting) based on environmental features of the individual dwelling. These features either refer to:

- Features which the dwelling shares with all other dwellings on the site known as 'Site Wide' issues.
- Features which apply across to some common facility shared with a number of other dwellings known as 'Shared' issues (but less than the whole site).
- Features which relate to the performance of the dwelling itself known as 'Dwelling' issues.

In order to reduce the number of different assessments, dwellings may be combined together as similar 'Code Dwelling Types'. To be of the same 'Code Dwelling Type' dwellings must have exactly the same set of Code scoring features. Within each category, issues are scored initially as credits. They are then converted to their category weightings to percentage scores known as 'Points'.



## 4.0 Code for Sustainable Homes Report

### 4.1 Schedule of 'Code Dwelling Types'

Since this development is made up of only five units within the same structure it is believed at the current time that there will be only one Code Dwelling Type across the development.

It should however be noted that the units may perform differently under Standard Assessment Procedure (SAP) calculations. Also of note, the lower ground flat due to its layout may perform differently for the daylighting section and the ground floor flat has no private space.

This should be investigated further at the onset of a full Code for Sustainable Homes assessment.

### 4.2 Credit Summary

The following table gives a summary of credits identified:

		Available	★★★
<b>Energy</b>			
ENE 1	Carbon Dioxide Emissions	15	5
ENE 2	Building Fabric U Values	2	2
ENE 3	Internal Lighting Efficiency	2	2
ENE 4	Drying Space	1	1
ENE 5	Energy Labelled White Goods	2	2
ENE 6	External Lighting Efficiency	2	2
ENE 7	Low and Zero Carbon Technologies	2	0
ENE 8	Cycle Storage	2	1
ENE 8	Home Office	1	1
		<hr/> 29	<hr/> 16
<b>Water</b>			
WAT 1	Internal Water Consumption	5	3
WAT 2	External Water Recycling	1	1
		<hr/> 6	<hr/> 4
<b>Materials</b>			
MAT 1	Environmental Impact of Materials	15	7
MAT 2	Basic Elements, Responsible Sourcing	6	3
MAT 3	Finishing Elements, Responsible Sourcing	3	2
		<hr/> 24	<hr/> 12
<b>Surface Run-Off</b>			
SUR 1	Reduction of Surface Run-Off	2	2
SUR 2	Flood Risk	2	2
		<hr/> 4	<hr/> 4
<b>Waste</b>			
WAS 1	Household Waste Storage	4	4
WAS 2	Construction Site Waste Management	2	2
WAS 3	Composting	1	0
		<hr/> 7	<hr/> 6
<b>Pollution</b>			
POL 1	Insulant GWP (and ODP)	1	1
POL 2	NOx Emissions	3	2
		<hr/> 4	<hr/> 3
<b>Health and Well Being</b>			
HEA 1	Daylighting in Room Spaces	3	2
HEA 2	Sound Insulation in Room Spaces	4	0
HEA 3	Private Space	1	0
HEA 4	Lifetime Homes	4	4
		<hr/> 12	<hr/> 6
<b>Management</b>			
MAN 1	Home User Guide	3	3



MAN 2	Considerate Contractors	2	1
MAN 3	Construction Site Impacts	2	1
MAN 4	Security	2	2
		9	7
<b>Land Use and Ecology</b>			
ECO 1	Ecological Values of Site	1	1
ECO 2	Ecological Enhancement	1	0
ECO 3	Protection of Ecological Features	1	1
ECO 4	Change of Ecological Value of Site	4	2
ECO 5	Building Footprint	2	2
		9	6
<b>Total credits</b>		<b>104</b>	<b>64</b>
<b>% Score</b>		<b>100</b>	<b>62.3</b>

These credit totals are translated into scores in Section 4.3

### 4.3 Pre-Assessment Results

The bar chart that follows shows where credits are in principle awarded against those that are available for each credit category. The total credits for each category are applied to the environmental weighting to achieve an overall score. This score is then compared against the ranges mentioned earlier to achieve an EcoHomes rating.

A total of 64 credits have been identified as being available. **This in turn equates to an Code score of 62.3%.** This score gives a good margin of error over the **Level 3 (★★★)** lower limit of 57%. To provide security against score reduction during a formal assessment or the BRE's QA processes, it is recommended that the final credits to be targeted should be discussed at the beginning of the full assessment.

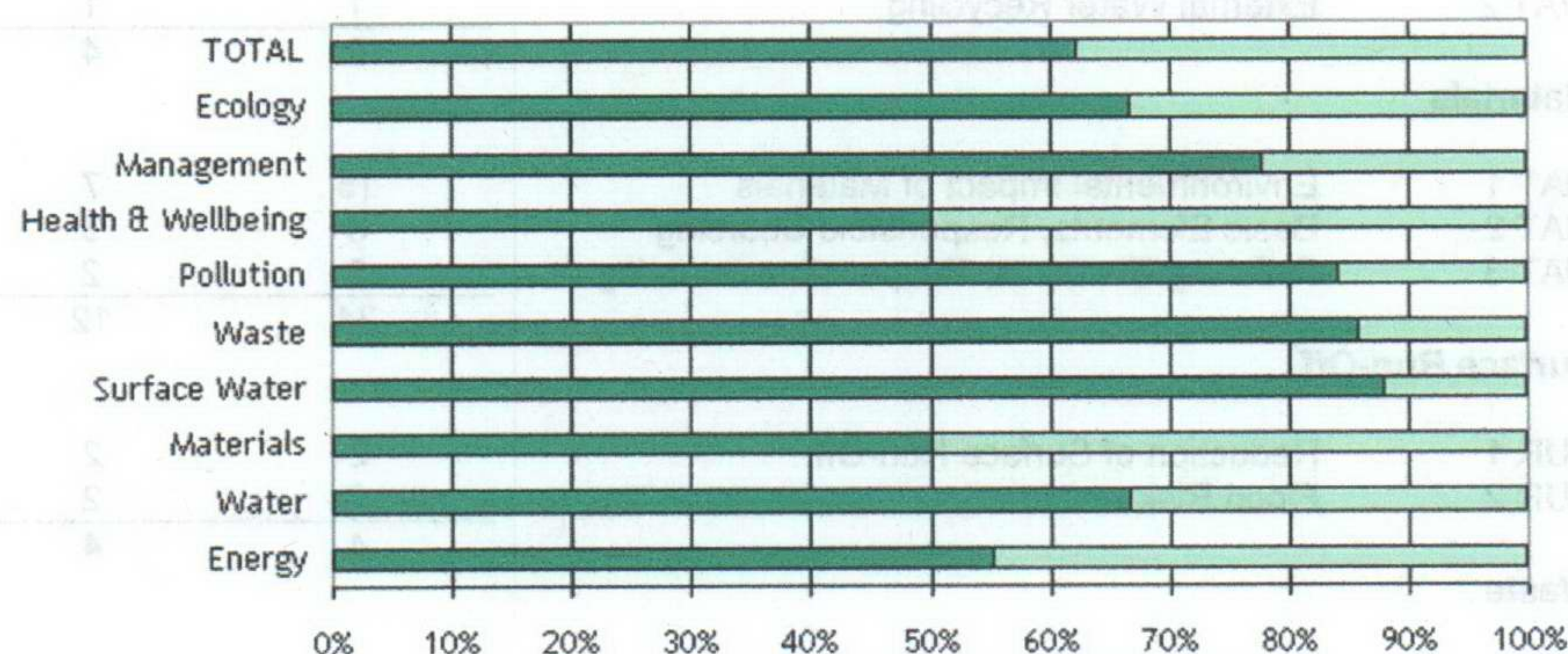


Fig 1. Bar chart showing credits targeted for each category

### 4.4 Key Features of the Pre-assessment

#### 4.4.1 ENERGY

- **ENE1:** Each dwelling needs to meet the mandatory Code requirement of a 25% improvement of CO<sub>2</sub> emissions over Building Regulations 2006. A sample preliminary SAP calculation was carried out on the second floor flat and with the following key improvements, achieved 26.87% over Building Regulations 2006:
  - Improving u-values of external walls (to 0.18W/m<sup>2</sup>K)
  - Improving u-values of windows (to 0.16 W/m<sup>2</sup>K) provided to a high specification



- Air permeability of 5 m<sup>3</sup>/hm<sup>2</sup> or less
- Condensing Combination Boiler with an efficiency 90%

It should be noted that the different flats, particularly the ground and top floors, may perform differently and all should be investigated further at the onset of a full Code assessment.

- **ENE2:** Since the building is to be built to better standards than Building Regulations 2006 with a commitment by the Design Team to 'design in' good energy efficiency, (in the SAP calculations above, a Heat Loss Parameter of 0.64 was achieved) it was felt that a Heat Loss Parameter of 1.1, and therefore both credits, could be targeted.
- **ENE3, ENE4&6:** The design team is also committed to providing adequate drying space for all dwellings (preferably on the balconies or in the garden, otherwise over the bath) and fully efficient internal and external light fittings, thereby achieving full credits in these sections.
- **ENE5:** White goods will be provided to the flats with an energy rating of 'A+' in the case of Fridge/Freezers, 'A' for washing machines and 'B' for washer dryers.
- **ENE7:** A Renewable Energy Feasibility Study will not be carried out since the Design Team is keen to make carbon savings by designing energy efficient buildings in the first instance.
- **ENE8:** There is already a commitment by the Design Team for provision of one covered, secure cycle storage space per dwelling unit (5 spaces) which certainly allows the first credit to be targeted. To satisfy the second credit, a further 5 cycle spaces would be necessary.
- **ENE9:** The Design Team will provide facilities for a home office to all dwellings e.g. two double sockets, two phone points, a 1.8m wall for the desk and an openable window. It was felt that there was enough space for this provision, whilst also being able to use the room in its intended way. This credit is important to reduce unnecessary travel to work so reduce the carbon impact of the residents.

#### 4.4.2 WATER

- **WAT1:** The mandatory requirement of no more than 105 litres/person/day internal water use was considered. The design team wishes to conserve water where possible, and understands that to meet this requirement, toilets will need to be provided with a 4/2l flush, low flow taps with flow regulators (e.g. with 3-4 litres/min), showers with a flow rate of 6 litres per minute and white goods provided with water efficiency in mind. If higher specification fittings are required e.g. the showers the design team will investigate rainwater harvesting from the roof (to feed either the toilets or washing machines or both) in order to ensure this requirement is achieved, and three credits awarded. There is space for the rainwater holding tank to the side of the development which can hold an estimated 42,000 litres. It is possible that, in this instance, 105 litres/person/day could be further reduced, gaining further credits and should be investigated at the onset of the full Code assessment.
- **WAT2:** The rainwater collected from the roof could also be used to water the external planting, so this credit is also targeted.

#### 4.4.3 MATERIALS

- **MAT1:** The minimum requirement has been met where materials for at least three of the key elements of construction listed below are specified to achieve a rating of at least D in the latest update of the BRE 'Green Guide to Housing Specification'. Further improvements in material selection have lead to a current target of seven out of fifteen credits. Some approximations from the Green Guide of what these might be can be found below.
  - **Flat Roof (inverted deck):** 'Plasterboard, beam and dense block deck, oxidised polyester reinforced bitumen roofing membranes, insulation, rounded pebbles', with an additional sedum roof – 'B' rating.



- **Solid Concrete Ground Floor:** 'Chipboard decking on vapour control layer, on timber battens and insulation on in-situ 30% PFA concrete (preferably 100% recycled concrete) floor on polyethylene DPM on blinded recycled aggregate sub-base' and **Steel Structure Upper Floor:** 'Panelised steel floor cassette with OSB (or plywood) decking and plasterboard ceiling' – 'A' rating average.
- **External walls:** 'Brickwork, insulation, aircrete blockwork inner leaf, plasterboard, paint' – 'A' rating
- **Internal walls – internal loadbearing partition:** 'Aerated blockwork with thin joint mortar, plasterboard, paint'; **internal non-loadbearing:** 'Timber stud, plasterboard, paint'; **party wall:** 'Steel jumbo stud partition, plasterboard and skim, glass wool insulation, paint'. All have an 'A' rating.
- **Windows** will be likely be sourced in aluminium, so will not have an 'A' rating.
- **MAT2:** 3 out of 6 credits will initially be targeted, with an aim to source as much of the materials for basic elements from responsible sources e.g. FSC (Forest Stewardship Council) or EMS (Environmental Management Systems).
- **MAT3:** 2 of a total of 3 credits will initially be targeted, with an aim to source the majority of all materials for finishing elements from responsible sources e.g. FSC (Forest Stewardship Council) or EMS (Environmental Management Systems).

#### 4.4.4 SURFACE WATER RUN OFF

- **SUR1:** Due to the sedum roof and, subject to confirmation of a low probability of flooding and that the sedum will attenuate 50% run off at peak period the first credit can be achieved. Since there is no hard landscaping (as the development is entered directly from the street) and car parking etc is in the basement, this credit can also be achieved by default. At this stage it is assumed that the sedum roof can work together with the rainwater collection system proposed. Since the run off will be no worse than the previous use of the site, the mandatory requirement should also be achieved.
- **SUR2:** The development is not located near any water courses, so it is currently presumed that there is a low probability of flood and therefore these credits are currently targeted.

#### 4.4.5 WASTE

- **WAS1:** Mandatory requirements of provision of a large enough storage area for either Local Authority recycling bins or minimum British Standards will be met. Since there is a local recycling collection service collecting at least three different sorts of waste, and three internal storage bins of adequate size for recycling will be provided e.g. under the sink in every dwelling, all four credits will be targeted here.
- **WAS2:** The mandatory requirement of a plan to monitor site construction and set targets (to promote resource efficiency) will be met. These commitments will include procedures to minimize and sort, reuse and recycle waste in order to achieve full credits.
- **WAS3:** Composting facilities will not be provided under current plans.

#### 4.4.6 POLLUTION

- **POL1:** Insulation with GWP (Global Warming Potential) of less than five and Ozone Depleting Potential (ODP) of zero will be provided.
- **POL2:** In this category, the NOx emissions section (POL2) is targeted. Provided the boilers used in the developments will be of a class of 5, then two of the three credits can be awarded.



#### 4.4.7 HEALTH AND WELLBEING

- **HEA1:** Daylighting credits for the living rooms only can be currently achieved but, it is hoped there is a view of the sky in each room including the kitchen so two credits are currently targeted for all flats.
- **HEA2:** Since it is not known currently what the sound testing regime will be and whether minimally airborne sound 3dB higher and impact sound 3dB lower than Building Regulation standards can be achieved, these credits are not currently targeted.
- **HEA3:** The Private Space credit is not targeted since the ground flat does not have its own outdoor space.
- **HEA4:** All flats will achieve 13 out of the 16 points required for Lifetime Homes, therefore these credits are targeted.

#### 4.4.8 MANAGEMENT

- **MAN1:** A Home User Guide will be produced to target the full credits.
- **MAN2:** A Contractor will be employed who is part of the Considerate Contractor Scheme to target one out of the two credits.
- **MAN3:** This contractor will also consider a number of construction site impacts, CO<sub>2</sub> and energy arising from site activities and transport, water consumption, air and water pollution and use of responsibly sourced or recycled site timber. Initially one credit will be targeted here.
- **MAN4:** Adequate security will be provided and a Secure by Design Award will be investigated, to achieve both security credits.

#### 4.4.9 LAND USE AND ECOLOGY

- **ECO1:** Since the development is to be built on land where there is currently an existing development, of no ecological value, then this credit is currently targeted.
- **ECO2:** There are no plans currently to involve an Ecological Consultant therefore this credit is not currently targeted.
- **ECO3:** There are no ecological features existing on the current site, so one credit can be awarded for this category automatically.
- **ECO4:** As an Ecological Consultant is not currently involved, it can be assumed that the development will leave the land at least as ecological rich as before it was built, therefore two credits can be targeted for no change.
- **ECO5:** The building consists of five floors not including the basement car park/cycle storage area, so since this is more than 4 floors, both credits can be targeted.

#### 4.5 Further Consideration

Should it not be possible to target all the 'tradable' credits listed above, or if the client wishes to exceed the above targets and target a Code Level 4 (★★★★) rating, a number of further considerations are detailed below:

- Further inroads into the CO<sub>2</sub> emissions section (ENE1) e.g. achieving a 44% improvement of carbon emissions over Building Regulations 2006 which is arguably the most taxing mandatory requirement to achieving Code Level 4.
- Achievement of the above would involve serious consideration of renewable energy systems to offset a minimum of 10% energy demand (ENE7).
- To satisfy the second cycle storage credit, a further 5 cycle spaces would be necessary. This appears achievable, as there is space for these extra facilities and therefore the second credit could be targeted (ENE8).



- With some of the internal water being provided by rainwater harvesting, it may be possible to achieve reduced internal water usage and target further credits in the internal water section. The same target level of 105 litres/person/day is required for Code Level 4 (WAT1).
- Target Class 5+ (as opposed to 5) boilers to achieve all credits for POL2.
- Look into making further improvements in the Materials category by sourcing more 'A' rated materials and more from sustainable sources such as FSC.
- Achieve further credits in the sound insulation section by achieving, for example, airborne sound 3dB higher and impact sound 3dB lower than Building Regulation standards (HEA2).
- In the Management category, employ a Considerate Contractor who will commit to going beyond best practices in this scheme, and monitor a minimum of four site impacts from CO<sub>2</sub> and energy arising from site activities and transport, water consumption, air and water pollution and use of responsibly sourced or recycled site timber.
- Given the proposed provision of a sedum roof and living wall, involvement of a Qualified Ecologist would help to use these features and the back garden to improve the biodiversity and gain more credits in the Ecology section.

These issues can be discussed at the onset of the full Code for Sustainable Homes assessment.