



BRUNSWICK RIVERSIDE  
NEWMARKET ROAD  
CAMBRIDGE

# SUSTAINABILITY STATEMENT

CCC SUSTAINABILITY CHECKLIST  
BREEAM & CODE FOR SUSTAINABLE HOMES PRE-ASSESSMENT  
RENEWABLE ENERGY STATEMENT

SPRING 2009

# BRUNSWICK RIVERSIDE, CAMBRIDGE

---

## Sustainability Statement

February 2009

Revision D



# REVISIONS

---

<b>Date</b>	<b>Revision</b>	<b>Status</b>	<b>Comment</b>	<b>Q/A</b>
13.05.08	-	Draft	For comment	307.140 / 19.1
20.05.08	A	Draft	For comment	307.140 / 19.1
05.06.08	B	Preliminary	For planning	307.140 / 19.1
06.02.09	C	Draft	For comment	307.140 / 19.1
17.02.09	D	For Issue	For planning	307.140 / 19.1

---

# PREFACE

---

This Sustainability Checklist prepared by RYB:Konsult on behalf of Berkeley Homes has been compiled in support of contemporaneous planning applications for the comprehensive redevelopment of the former Cambridge Regional College City Centre Campus – “The Brunswick site”, together with land to the south west currently known as Brunswick House, 61-69 Newmarket Road, Cambridge (known as the Rear and Front Sites respectively).

The information contained within this Energy Strategy relates to the redevelopment of the combined sites to provide 205 Residential Units, 251 Student Rooms (in lieu of Affordable Housing), Café, Public Open Spaces (including a new public thoroughfare through the site) and associated works. This document should be read in conjunction with both the Detailed Planning Applications and Conservation Area Consents for Rear & Front Sites respectively. These applications have, in agreement with officers from Cambridge City Council’s Planning Department, been submitted contemporaneously and will be considered jointly by the Council in due course.

Where necessary, specific reference has been made within this Energy Strategy to matters which relate solely to either of the applications for the purpose of ensuring that each application may be considered independently should the need arise.

‘It remains the applicant’s firm intention that both the Rear & Front Sites are redeveloped comprehensively in the event that the respective applications are approved simultaneously.’

# CONTENTS

---

Section	Title	Page
<b>SUSTAINABILITY STATEMENT AND CHECKLIST</b>		<b>1</b>
<b>1</b>	<b>Introduction</b>	<b>6</b>
1.1	Purpose of Statement	6
1.2	Definition of Sustainable Development	6
1.3	Site Description	6
1.4	Project Description	6
<b>2</b>	<b>Policy Context</b>	<b>8</b>
2.1	International	8
2.2	National	8
2.3	Regional	9
2.4	Local	10
<b>3</b>	<b>Sustainability Strategy</b>	<b>11</b>
3.1	Urban Design	11
3.2	Transport	11
3.3	Sustainable Drainage Systems (SUDS)	13
3.4	Energy	14
3.5	Recycling & Waste Facilities	15
3.6	Biodiversity	16
3.7	Pollution	16
3.8	Climate Change	18
3.9	Water	18
3.10	Materials & Construction Waste	19
3.11	Historic Environment	19
<b>4</b>	<b>Conclusion</b>	<b>20</b>
<b>5</b>	<b>Sustainability Checklist</b>	<b>21</b>
<b>ENERGY STRATEGY</b>		<b>28</b>
<b>6</b>	<b>Executive Summary</b>	<b>30</b>
<b>7</b>	<b>Introduction</b>	<b>32</b>
<b>8</b>	<b>Methodology</b>	<b>35</b>
<b>9</b>	<b>Energy Demand</b>	<b>36</b>
<b>10</b>	<b>Combined Heat and Power</b>	<b>38</b>
<b>11</b>	<b>Renewable Technology Options</b>	<b>39</b>
<b>12</b>	<b>Conclusion</b>	<b>42</b>
<b>13</b>	<b>Energy Strategy CHP Calculations</b>	<b>43</b>
<b>14</b>	<b>Energy Strategy 'Other' Energy Use Calculations</b>	<b>44</b>
<b>15</b>	<b>Energy Strategy SAP Calculation Results</b>	<b>45</b>

# CONTENTS

---

<b>PRELIMINARY CODE FOR SUSTAINABLE HOMES REPORT</b>		<b>47</b>
<b>16</b>	<b>Introduction</b>	<b>48</b>
16.1	Proposed Development	48
16.2	Code for Sustainable Homes	48
16.3	Scoring System	48
<b>17</b>	<b>Pre-Assessment Summary</b>	<b>49</b>
<b>18</b>	<b>Pre-Assessment Results</b>	<b>58</b>
<b>19</b>	<b>Code Mandatory Requirements</b>	<b>59</b>
19.1	Carbon Dioxide Emissions	59
19.2	Potable Water Consumption	59
19.3	Embodied Impacts of Construction Materials	59
19.4	Surface Water Run Off	59
19.5	Construction Site Waste Management	60
19.6	Household Waste Storage Space and Facilities	60
<b>PRELIMINARY BREEAM MULTI-RESIDENTIAL REPORT</b>		<b>62</b>
<b>20</b>	<b>Introduction</b>	<b>62</b>
20.1	Proposed Development	62
20.2	BREEAM Multi-residential 2006	62
20.3	Scoring System	62
<b>21</b>	<b>Pre-Assessment Estimator</b>	<b>64</b>
<b>22</b>	<b>Pre-Assessment Results</b>	<b>77</b>

# 1 INTRODUCTION

---

## 1.1 Purpose of Statement

This Sustainability Statement, referred to hereafter as the 'Statement', is intended to objectively demonstrate that the Proposed Development:

- Responds to the sustainability issues of international, national, regional and local planning policies - focusing on the Cambridge City Council Local Plan (2006).
- Contributes to the sustainable development of the local area; and
- Can be considered Good Practice in Sustainable Design.

It covers both the construction and occupation phases, and is organised in the following sections:

- Policy Context;
- Sustainability Assessment; and
- Summary.

## 1.2 Definition of Sustainable Development

The most common definition of Sustainable Development is taken from the Brundtland Report (1987).

*"Development that meets the needs of the present without compromising the ability of future generations to meet their own needs".*

The UK Government's Sustainable Development Strategy (see below) accepts for the first time the idea of environmental limits and places this as one of the primary objectives. The four other 'Guiding Principles' of the strategy are: ensuring a strong and healthy and just Society; achieving a sustainable economy; promoting good governance; and using sound science responsibly.

## 1.3 Site Description

The site is currently occupied by Cambridge Regional College (CRC) and 61 - 69 – Brunswick House, an educational establishment which provides courses to both school leavers and adult learners. The college is relocating to an alternative site on the northern fringes of Cambridge in 2009.

The site is located just on Newmarket Road, Cambridge. The site is bounded by Midsummer Common to the North; by Newmarket Road to the South, by Elizabeth Way to the East and by allotments and residential properties in Evening Court to the West. It occupies an area of approximately 1.85 hectares currently consisting of several single storey buildings, associated car parks and courtyards to the rear with a two story 1980's office block fronting Newmarket Road.

## 1.4 Project Description

The Proposed Development is a residential led mixed-use scheme to include 195 apartments, 10 5-bed townhouses, 251 student rooms (to be provided in lieu of Affordable Housing) community café, new public thoroughfare and associated works. A mixture of one-, two-, and three-bedroom flats is proposed, arranged over five different blocks.

The majority of units will be provided with a private amenity space in the form of either gardens, balconies and or roof terraces. For the private residential units, car parking is limited to 195 spaces for all residential flats. 349 cycle spaces are also provided for the apartments with associated visitor spaces at ground level while the townhouses have adequate space internally for four cycle spaces each.

Also at the development, a total of 251 accommodation units for students would be provided. For the student accommodation, 6 car parking spaces have been provided, along with 170 cycle spaces and 51 visitor cycle spaces.

The site also has excellent public transport links. High performance materials have been specified for the building fabric to reduce energy consumption. The Local Plan target, stated in Policy 8/16, for the offsetting of the proposed developments carbon emissions (10%) will be met by using solar water heating, after implementing energy efficiency measures and a centralised CHP unit.

The development has been designed to meet, or exceed, the policies set out in the Cambridge Local Plan 2006, specifically those listed in section 2.4 of this report, and is primarily in line with the guidance given within the Cambridge Supplementary Planning Document.

### **1.5 Energy Strategy**

The energy strategy included within this document details the investigations into energy saving measures at a design stage, the introduction of CHP, and the options considered for renewable energy technology, in line with the hierarchy of feasible options suggested in the Cambridge SPD (paragraph 2.4.9). The energy strategy investigated the renewable technology options available at the proposed development, and articulates why certain renewable technologies were discounted from further investigation. The favoured option of solar water heating is investigated in more detail, and in combination with a gas fired CHP unit.

Berkeley Homes (Capital) PLC are pushing to achieve a 20% reduction in carbon emissions, however, it has been very difficult to achieve this aspiration due to conflicting local plan policy requirements, and the energy strategy has been adjusted accordingly from the original aspiration. However, it is shown that considerable effort has been made to reduce carbon emissions as much as possible at the proposed development.

### **1.6 Code for Sustainable Homes**

The preliminary Code for Sustainable Homes report also forms part of this document and details the credits that are being targeted for the residential units to achieve Code Level 3. This requires a 25% reduction of carbon emissions over Part L (2006), and details are given within

the document on how the proposed development (for the residential units) will achieve Code Level 3.

### **1.7 BREEAM Multi-Residential**

The student units have aspired to achieve a BREEAM 'Very Good' rating. BREEAM is a voluntary scheme that aims to quantify and reduce the environmental burdens of buildings by rewarding those designs that take positive steps to minimise their environmental impacts.

# 2 POLICY CONTEXT

---

Sustainable Development policies have been developed at an international, national, regional and local level. The major legislation relevant to the Proposed Development is outlined below.

## **2.1 International**

### ***2.1.1. International Earth Summit, 1992***

The Rio Earth Summit saw the culmination of increasing global environmental and sustainability concern in the development of a number of multilateral outputs. These included two international agreements and a major action agenda on world wide sustainable development:

### ***2.1.2. United Nations Framework Convention on Climate Change (UNFCCC), 1992***

The UNFCCC aims to stabilise greenhouse gas concentrations in the atmosphere to prevent dangerous damage to the climate system. The ratified Kyoto Protocol (1997) sets emission targets for industrialised countries. The UK has accepted a 12.5 % reduction in greenhouse gases in the period 2008-2012.

### ***2.1.3. Convention on Biological Diversity, 1992***

This Convention sets out commitments for maintaining biodiversity in the context of global economic growth. It has three main goals: the conservation of biological diversity; the sustainable use of its components; and the fair and equitable sharing of the benefits from the use of genetic resources.

### ***2.1.4. Agenda 21, 1992***

Agenda 21 provides a blueprint on how to make development socially, economically and environmentally sustainable. It offers policies and programmes to achieve a sustainable balance between consumption, population and the Earth's life-supporting capacity. Agenda 21 calls

on governments to adopt national strategies for sustainable development which should be developed with wide participation, including local authorities, business, non-government organisations and the public.

### ***2.1.5. Aarhus Convention (2001)***

The United Nations Economic Commission for Europe (UNECE) Convention on Access to Information, Public Participation in Decision-Making and Access to Justice in Environmental Matters, or 'Aarhus Convention' was adopted in 1998 and entered into force in 2001.

## **2.2 National**

### ***2.2.1. Home Energy Conservation Act, 1995***

The Act aims to secure improvements in energy efficiency in the domestic sector. It requires every UK local authority with housing responsibilities to produce an energy conservation report that identifies practicable and cost-effective ways of improving the energy efficiency of all residential accommodation in their area; and to report on progress made in implementing the measures.

### ***2.2.2. Community Strategy – Local Government Act, 2000***

The Act placed a duty on Local Authorities to produce a community strategy promoting the social, economic and environmental well-being of their areas and contributing to the achievement of sustainable development in the UK.

### ***2.2.3. Local Sustainability Indicators, 2000***

This document presents ideas for measuring sustainable development and quality of life in local communities.

#### **2.2.4. Sustainable Communities: Building for the Future, 2003**

Sets out the Government's long-term programme of action to tackle pressing problems and raise the quality of life of communities in England.

#### **2.2.5. Planning Policy Statement 1 (PPS 1), 2004**

PPS 1 sets out the Government's overarching planning policies on the delivery of sustainable development through the planning system. It states that, "Sustainable development is the core principle underpinning planning. At the heart of sustainable development is the simple idea of ensuring a better quality of life for everyone, now and for future generations".

#### **2.2.6. Planning Policy Guidance 13 (PPG 13), 2001**

The objectives of PPG 13 are to integrate planning and transport at the national, regional, strategic and local level; and to promote more sustainable transport choices both for carrying people and for moving freight. It also aims to promote accessibility to jobs, shopping, leisure facilities and services by public transport, walking and cycling; and to reduce the need to travel, especially by car.

#### **2.2.7. Planning Policy Statement 22 (PPS 22), 2004**

PPS 22 sets out the Government's national policy for renewable energy, in terms of both dedicated renewable generation projects (e.g. wind farms) and 'embedded' generation. It states that "local planning authorities may include policies in local development documents that require a percentage of the energy to be used in new residential, commercial or industrial developments to come from on-site renewable energy developments".

#### **2.2.8. UK Sustainable Development Strategy, 2005**

Securing the Future, the UK Sustainable Development Strategy, builds on the previous report (1999) taking into account devolution and the changed structure of government in the UK. It also reflects the new policies that have emerged since the previous strategy and includes a stronger international element. It focuses on four priorities: sustainable consumption and production; climate change; natural resource protection; and sustainable communities.

#### **2.2.9. The Energy White Paper, 2007**

The Energy Challenge, the recent Energy White Paper presents international and national strategies to reduce carbon dioxide emissions and ensure the supply of secure, clean and affordable energy. It succeeds the 2003 Energy White Paper which sets out Government's long-term strategic vision for energy policy.

#### **2.2.10. Planning for a Sustainable Future, 2007**

This White Paper aims to reform the planning system to streamline decision making in particular for major infrastructure projects. It is set around 5 key principles: planning must be responsive, particularly to longer term challenges such as increasing globalisation and climate change, and properly integrate our economic, social and environmental objectives to deliver sustainable development; the planning system should be streamlined, efficient and predictable; there must be full and fair opportunities for public consultation and community engagement; the planning system should be transparent and accountable; and planning should be undertaken at the right level of government – national, regional and local.

### **2.3 Regional**

#### **2.3.1. Cambridgeshire and Peterborough Structure Plan, 2003**

The regional spatial strategy for the East of England, which is currently undergoing consultation, is intended to replace the current Regional Planning Guidance (RPG6) and elements of the 2003 Cambridgeshire Structure Plan. The Structure Plan sets the strategic framework for land use planning in Cambridgeshire and Peterborough in the period up to 2016, with a proposed target of 14% of electricity generated from all renewable sources by 2016. Although Policy 7/7 has now expired, there is still definitive guidance within the Structure Plan relating to sustainable development. "A major contribution to the achievement of sustainable development can be made through good design. Policy P1/3 requires that every aspect of a development proposal is examined to ensure that its performance is as sustainable as possible. Detailed design is as important as overall strategy in achieving sustainable development objectives".

## **2.4 Local**

### **2.4.1. Cambridge City Council Local Plan, 2006 - Policy 3/1**

Local Plan Policy 3/1 'Sustainable Development' states that "Development will be permitted where it meets the principles of sustainability". The Council has prepared, and adopted as Supplementary Planning Guidance, the Cambridge Sustainable Development Guidelines, which provide guidance and sources of information and advice on how development proposals can become more sustainable, for example by: reducing the use of natural resources, including energy and water; making more efficient use of land; safeguarding and enhancing the historic built environment; protecting and enhancing wildlife and the natural environment; minimising waste and pollution to land, air and water; siting and designing development to reduce the need to travel, especially by car; reducing the need for new build by retaining and reusing existing buildings. Further guidance is given in the Supplementary Planning Document (June 2007).

### **2.4.2. Cambridge City Council Local Plan, 2006 - Policy 3/12**

Local Plan Policy 3/12 'The Design of New Buildings' states that, "New buildings will be permitted where it can be demonstrated that they: have a positive impact on their setting in terms of location on the site, height, scale and form, materials, detailing, wider townscape and landscape impacts and available views; are convenient, safe, and accessible for all users and visitors; and are constructed in a sustainable manner, easily adaptable and which successfully integrate refuse and recycling facilities, cycle parking, and plant and other services into the design".

### **2.4.3. Cambridge City Council Local Plan, 2006 - Policy 8/16**

Cambridge's Local Plan Policy 8/16 states that "Developers of major proposals above a threshold of 1,000 square metres or 10 dwellings will be required to provide at least 10% of the development's total predicted energy requirements on-site, from renewable energy sources. These requirements may be relaxed if it can be clearly demonstrated that to require full compliance would not be viable".

### **2.4.4. Cambridge City Council Local Plan, 2006 - Policy 8/17**

Cambridge's Local Plan Policy 8/17 states that, "Applications for renewable energy schemes or technologies will be permitted if applicants can demonstrate that: any adverse impacts to the environment or amenity have been minimised as far as possible; and where any localised adverse environmental or amenity effects remain, that these are outweighed by the wider environmental, economic or social benefits of generating energy from renewable sources".

### **2.4.5. Cambridge City Council Supplementary Planning Document – Sustainable Design and Construction, 2007**

As a supplementary planning document, an SPD is a material consideration in the determination of planning applications. Ensuring considerable growth in Cambridge is implemented as sustainably as possible will play an important part in ensuring that Cambridge reduces its environmental impact – minimising carbon emissions, flood risk, pollution and pressure on resources.

# 3 SUSTAINABILITY STRATEGY

---

In this Section measures proposed to mitigate and enhance sustainable and environmental objectives related to the Proposed Development are presented. In Section 4, a checklist is provided of the Cambridge City Councils (CCC) relevant local policies from the CCC Supplementary Planning Document on Sustainable Design and Construction.

## 3.1 Urban Design

The residential development incorporating a mix of private and student accommodation provides a vibrant social mix.

The Proposed Development incorporates a series of courtyards which:

- Reflect Cambridge's traditional architecture;
- Create a strong sense of enclosure, where appropriate;
- Make a clear distinction between public and private space; and
- Create high quality public realm.

A number of very high quality public and private landscaped areas have been created across the site.

### 3.1.1. Walkable neighbourhood

The scheme has been designed to achieve a high degree of permeability for pedestrian and cycle movements for residents, visitors and members of the public. A major new pedestrian route connects Newmarket Road to the Midsummer Common, including disabled access, benefiting those living on the Riverside. Pedestrian access has also been created between Walnut Tree Avenue and the main entrance courtyard, and between Newmarket Road and the student accommodation. Pedestrian routes run through the development, to residential areas and the central tower, with cycle paths provided at the perimeter.

### 3.1.2. Activity nodes

Cambridge city centre is located approximately 1km to the south-west of the site. The city centre can be accessed either on foot, cycle or bus routes available in the vicinity of the site.

The site benefits from being located within the immediate vicinity of the Grafton Centre. The shopping centre contains a wide variety of shops, restaurants and a cinema. A number of local shops are also located on Newmarket Road, to the east of the signalised roundabout.

There are also child nurseries, primary and secondary schools, and healthcare centres within 1 km of the site.

### 3.1.3. Sustainable buildings

The Proposed Scheme for private residential development is committed to achieve a Code for Sustainable Homes Level 3. A preliminary Code assessment has been carried out and it has been demonstrated that the required score would be achieved.

The Proposed Scheme for the student accommodation is committed to achieve a BREEAM 'Very Good' rating. A preliminary BREEAM assessment has been carried out and it has been demonstrated that the required score would be achieved.

## 3.2 Transport

### 3.2.1. Promoting Walking and Cycling

The pedestrian environment within the site will be of high quality with the provision of attractive open spaces, well-maintained and legible routes, lighting, signage and the use of quality materials.

Pedestrian access to the development site will be directly from Newmarket Road via the existing CRC access road

or the newly created principle thoroughfare, from Midsummer Common, or from Walnut Tree Avenue. Pedestrian routes will benefit from appropriate lighting, landscaping and public art strategies which will be coordinated to ensure a high quality environment.

The development will benefit from its excellent relationship with the existing cycle network with the Newmarket Road frontage forming part of the cycle network in the area.

The development will include secure cycle parking facilities within the development buildings at ground floor level and within the basement. There will also be cycle stands provided for visitors which will be integrated into the landscaping on the site.

It is proposed to provide the following cycle parking provision in accordance with maximum Cambridge City Council standards:

- Private Flats: 349 spaces;
- Student Units: 170 spaces (and 51 additional visitor spaces); and
- Houses: Space for four or more bicycles per unit within large garages.

It is considered that the provision of cycle parking in accordance with local standards and the availability of high quality cycle routes in the vicinity of the site will contribute to the high mode share that cycling enjoys in Cambridge. The site is therefore readily accessible by cycle, thus contributing towards reduced car dependency. Furthermore, the ratio of car parking spaces per unit equates to 0.8 spaces per flat, 2 spaces per townhouse, and 6 spaces for the entire student accommodation block.

### **3.2.2. Travel plan**

A Framework Travel Plan has been developed for the site, with the following general objectives:

- To establish site-wide principles which will apply to the Travel Plan;
- To reduce car dependency and demand for car parking spaces by monitoring traffic generation against agreed reference levels;

- To raise awareness of sustainable modes of transport available to and from the site for residents and visitors; and
- To increase the attractiveness of walking and cycling for residents living within the development, in particular of walking and cycling for short journeys.

A Travel Plan Manager (TPM) will be appointed by the site and a Travel Plan Co-ordinator (TPC) for the student units will be appointed from a representative of the relevant student association.

The TPM will oversee the co-ordination of the measures and provide Cambridgeshire Council with a single point of contact. The TPM be responsible for day to day management of the Travel Plan, to liaise with the Local Authority, to assist new residents with sustainable travel incentives and to deal with the day to day marketing and monitoring of the Travel Plan.

In addition to the above measures, the Proposed Development will support homeworking by inclusion of potential workspace areas wherever possible with additional electrical and telephone line connections and access to outdoor views.

### **3.2.3. Public Transport**

The Brunswick site is well connected to public transport. Bus services run along the site frontage of Newmarket Road and Elizabeth Way with bus stops available within 160m of the site. Cambridge city centre can be accessed within a short bus journey where further bus services can be obtained. Furthermore, both bus services available from the site provide access to Cambridge city centre with bus route 3 providing a link to the railway station.

Under the Travel Plan, information packs including maps, timetables and routes will be provided as part of the welcome or new starter pack to residents. The public transport information pack will include maps/routes of bus services, and mainline railway services which are accessible from the site.

It also is proposed to support the use of public transport by exploring the viability of implementing a car club within the site. Car clubs are particularly useful for residents who

only need to use a car occasionally, such as making a 'big shop' at the supermarket, or a late-night journey, whilst preferring to use public transport at other times.

Commuter and regional rail services can be accessed from Cambridge railway station. The station is located at a distance of approximately 2.1km from the site, a 7 minute cycle, or a 26 minute walk, or 18 minutes by bus.

A Transport Assessment carried out for the site has indicated that the Proposed Development will have no significant negative impact on the local public transport infrastructure.

#### **3.2.4. Car Parking Strategy**

Vehicular access to the development is proposed directly from Newmarket Road. Limited vehicular access is to student units would be provided from the existing CRC on Newmarket Road.

It is proposed to provide 195 car parking spaces for the private flats within a basement car park. This figure includes provision for 16 disabled parking spaces, and equates to 1:1 spaces per unit. A total of 20 allocated parking spaces are proposed for the houses, equating to two spaces per unit.

In addition, residents of the development will be excluded by the Council from purchasing permits to park in the CPZ. However, as it is understood that currently residents could still apply for visitors permits, a further 10 visitor spaces are proposed within the site, to limit any effect on local residential roads. These visitor spaces will be accessed from Newmarket Road, and will be managed by the on-site management company.

A total of 6 car parking spaces are proposed for the student units, including one disabled space. These spaces are primarily to allow for people moving into and out of the student units, and for some essential staff car parking. However, should there be more disabled students, additional spaces from the aforementioned total could be made available to these users.

#### **3.2.5. Construction Traffic**

Transport impacts associated with the demolition and construction phases of the Proposed Development will be mitigated under the Considerate Constructors Scheme

(CCS). Mitigation measures proposed to minimise these impacts include:

- Considering vehicular access routes to avoid sensitive areas where possible;
- Limiting on-site parking to transportation of heavy equipment or vehicles; and
- Encouraging construction workers to use public transport and car sharing, where practical.

### **3.3 Sustainable Drainage Systems (SUDS)**

A Flood Risk Statement and a Drainage Strategy have been conducted taking account of PPS 25.

According to the Environment Agency's Flood Zone Map, the site is located entirely in Flood Zone 1 (little or no risk). The topographical survey for the site shows that the lowest part of the site is 2.4m above the 1 in 100 year flood level (associated with the River Cam).

A desk study and ground investigation report prepared for the site indicates that the ground beneath a layer of topsoil consists of a moderate thickness of made ground, River Terrace Gravel underlain by Gault Clay. Therefore risk of flooding as a result of groundwater flooding is unlikely to occur at the site.

The current site (1.85 ha) is approximately 68% hard standing (1.25ha). Therefore, the current run-off rate is approximately 173l/s for a one year rainfall event (calculated using the Modified Rational Method).

The hard standing for the Proposed Development is approximately 1.29 ha, providing a slight reduction in surface water runoff.

Correspondence with the Environment Agency states that 'if the overall impermeable area of the Proposed Development is less than that of the existing development, no attenuation would normally be required onsite, providing that there is no change to the SW sewer diameters, outfalls and receiving system'. Environment Agency correspondence also states that 'We are currently seeking betterment for brownfield redevelopment sites, where practicably possible as appropriate mitigation.

The topographical survey carried out for the site indicates that the existing drainage regime for the site comprises a

traditional gully and private gravity sewer system. Information gathered indicates that the on-site drainage system is likely to be connected with Anglian Water (AW) surface water network. The ground conditions confirmed by the topographical survey indicate that the use of SUDS using infiltration is not feasible.

The proposed surface water strategy seeks to reduce the runoff considerably to meet sustainability principles to reduce flood risk, and to meet the Code for Sustainable Homes' requirement of at least a 50% improvement over the existing situation.

It is proposed to use tanked cellular storage to attenuate the runoff generated by the site. Three locations for cellular storage are proposed.

- Block A,D,E (0.656ha) drain to Tanked Cellular Storage (TCS) 1
- The student accommodation and student car park (0.34ha) drain to TCS 2
- Block C (0.282ha) drains to TCS 3

The proposed TCS 1 and TCS 3 have a storage depth of 0.8m. The proposed TCS 2 has a storage depth of 0.4m. TCS 1 and TCS 2 have a proposed outfall to the 225mm diameter AW surface water sewer in Newmarket Road. TCS 3 has a proposed new outfall to the AW surface water sewer in Walnut Tree Avenue. For further details and a plan of the proposed surface water drainage strategy, refer to the Flood Risk Assessment and Drainage Strategy report.

Proposed outfall rates (based in microdrainage calculations) indicate a significant betterment in total runoff from the site for the Proposed Development in comparison to existing conditions.

The current run-off rate is approximately 173l/s for a one year rainfall event (calculated using the Modified Rational Method). This is reduced by 82% to 32.2l/s under the proposed drainage strategy.

The existing runoff is reduced by approximately 70% for a 1 in 30 return period storm event (from 392l/s to 115l/s).

Therefore the proposed strategy is robust and is sustainable in terms of flood risk.

AW has confirmed that the foul drainage from the Proposed Development can be accommodated within the existing sewerage system without the need for any offsite reinforcement. It is proposed that the existing connections to AW foul sewers in Newmarket Road and Walnut Tree Avenue be retained and re-used by the proposed re-development. Predicted discharge rates indicate a reduction in foul flows from the Proposed Development, and therefore provide betterment over the existing situation and is sustainable in terms of flood risk.

### **3.4 Energy**

A key aspect of the design of the Proposed Development has been the promotion of energy efficiency and reduction of carbon dioxide (CO<sub>2</sub>) emissions. This is demonstrated by the commitment to achieve energy targets that meet the Council's mandatory requirement to provide 10% of the developments on-site energy requirements from renewable energy sources, (Policy 8/16) set under the local planning policy and the Code for Sustainable Homes (for the residential units). The commitment to attain Level 3 of the Code, which requires a 25% reduction in emissions compared to Part L of the Building Regulations (2006), will also bring significant benefits to the carbon footprint of the Proposed Development. Although the BREEAM ratings are not mandatory, they show a commitment to sustainable buildings, and there is a commitment to achieve a 'Very Good' BREEAM rating for the student units.

An Energy Statement demonstrating compliance with the CCC Local Plan and Code Level 3 has been prepared and is provided in the energy strategy. The Energy Statement splits the site into two systems, the residential dwellings and the student accommodation.

In accordance with CCC guidelines for the Proposed Development, the following strategies have been considered: passive design and energy saving features; use of combined heat and power (CHP) systems; and incorporation of low or zero carbon technologies.

### **3.4.1. Passive Design**

Energy demand and passive design measures that would be incorporated into the Proposed Development include improved building material specifications, natural daylighting from large glazing, and localised lighting and heating controls. Where white goods are purchased these would all have A or A+ rating. Additionally a drying space would be provided in each unit to allow natural drying.

### **3.4.2. Combined Heat and Power**

A gas fired Combined Heat and Power (CHP) unit has been assessed and is considered suitable for the Berkeley Homes (Capital) proposed development. The CHP unit modelled provides 6kWe and 17kWth output, and full details are included in the Energy Strategy (sections 6 – 14) The CHP would be able to meet around half of the domestic hot water demand for Berkeley Homes (Capital) residential dwellings, and also be able to meet the background electrical load at the Berkeley Homes (Capital) site.

### **3.4.3. Renewable Energy**

In accordance with the list of renewable technologies to be considered in the Supplementary planning Document paragraph 2.4.15, a feasibility study was undertaken to assess the potential of renewable technologies. The full detail of the feasibility study is given in Energy Strategy (sections 6 – 15), and solar heating panels were considered to be the most viable technology. Subsequently, solar hot water panels were investigated in more detail, in combination with a gas fired CHP on the Berkeley Homes (Capital) site. This would achieve a reduction in excess of 10% of the annual carbon dioxide emissions of the Proposed Development, exceeding the requirements of the Local Plan and resulting in an overall reduction of 25% of the residential total CO<sub>2</sub> emissions compared to the total target emissions (or a 45% reduction compared to the Part L Standard target emissions). The UNITE student accommodation shall achieve the 10 % reduction in carbon dioxide emissions by solar hot water panels run as a separate system to the Berkeley Homes (Capital) site. A site wide Biomass system was considered but was dropped due to air quality reasons.

## **3.5 Recycling & Waste Facilities**

CCC offers a recycling service for three waste streams in addition to the residual waste collection. A site waste management plan has been developed to facilitate the separation, storage and collection of waste streams for the Proposed Development. The bin storage areas are primarily located next to the entrance lobby for ease of access, and the siting of these bin storage areas was designed for minimal carrying distance for all the units, with the furthest units being located within 60 metres of a bin store.

### **3.5.1. Internal storage**

Each private house and flat will be provided with internal storage bins to facilitate waste separation and recycling. The total storage capacity shall be a minimum of 30 litres per person and all recycling bins will be specifically designed labelled for recycling.

The kitchens for each flat cluster and individual studio within the student accommodation will also be provided with three internal storage bins (minimum total storage capacity of 30 litres) to facilitate waste separation and recycling.

A breakdown of accommodation is provided below for information:

Private Accommodation:

- 73 One-bed flats
- 90 Two-bed flats
- 32 three-bed flats
- Ten Town houses; Five-beds

Student Accommodation:

- 225 single occupancy flats arranged in 3 to 5 bed clusters
- 26 studio flats/micro pads.

### **3.5.2. External storage**

In addition to the internal storage an outdoor central dedicated storage space with an area of 41m<sup>2</sup> will be provided for the student units. This is to be located 8m

from the main entrance for convenient access and within the guidelines set by CCC.

The external storage has been sized to provide a total combined capacity of 180 litres per flat for the private residential accommodation, and a minimum of 2m<sup>2</sup> per 1000m<sup>2</sup> NIA for the student accommodation. All bin stores are located adjacent to the entrance lobbies or circulation cores for ease of access.

### **3.5.3. Refuse vehicle arrangements**

Service and refuse vehicle access for the residential and student components of the development would direct from Newmarket Road. Access for these vehicles to the student units is proposed via the existing CRC access.

## **3.6 Biodiversity**

A Biodiversity / Ecology Impact Assessment has been carried out based upon an ecological desk-top study, an Extended Phase 1 habitat survey undertaken in 2006 and again in 2007, and a bat survey (internal inspection and activity survey) undertaken in 2007.

The site has no statutory or non-statutory wildlife designations, and is not considered to be important or critical to any specially protected species. It is currently dominated by hardstanding and buildings with mown lawn, and is considered to be of negligible biodiversity value.

Mitigation measures have been proposed to reduce potential impacts upon common and widespread protected species to acceptable levels and to safeguard the adjacent Midsummer Common and nearby River Cam non statutory wildlife sites. Examples include retention of key trees around the site boundary, the creation of new landscaped areas, clearance of the site outside the nesting season or pre-site stripping search by a qualified ecologist, and careful design of lighting to avoid overspill onto adjacent bat foraging and commuting routes.

The landscape scheme and built development incorporates a number of biodiversity enhancements making the most of the retained habitat and creating new features. Management of biodiversity enhancements shall take place for at least 5 years, and where necessary, monitoring shall take place.

No features of biodiversity importance shall be lost or impacted upon and features used by common and

widespread species shall be replaced with a range of new features.

A Tree Survey has been carried out by an experienced, qualified arboriculturalist following guidance contained in British Standard 5837 (1991) "Trees in Relation to Construction." No Tree Preservation Orders (TPOs) are present on the site. The survey has indicated that no trees outside the site boundary shall be adversely affected by the Proposed Development. Over 40 new trees shall be planted on the site in carefully selected sustainable locations. Native species shall be specified in character with the nearby Midsummer Common. Approximately 24 trees shall be removed as part of the proposals; however these are considered to be of low public amenity.

## **3.7 Pollution**

### **3.7.1. Light Pollution**

An External Lighting Strategy has been prepared to present a number of lighting initiatives across the site. The lighting has been designed to optimise the security and visual amenity of the site by illuminating cycle and pedestrian paths and access points, and complimenting the landscape and public art strategies.

Where possible the use of lighting would be minimised and in all cases low energy fittings would be installed. Furthermore it is intended to follow compliance with the Institute of Lighting Engineers Guidance notes for the reduction of light pollution (2000).

External lighting would be designed to meet Secure by Design Standards to comply with BS5489 (see Socio-economic section below).

Additionally the following measures would be considered:

- Limits to the average upward light ratio of the luminaries, to restrict sky glow;
- Limiting illuminances at the windows of nearby properties for which light trespass might be an issue;
- Limiting light trespass to bat foraging and commuting routes;

- Limiting the intensity of each light source in directions outside the site;
- Limiting the average luminance of the Development; and
- Incorporating timers and daylight sensors to prevent unnecessary lighting in the day.

### **3.7.2. Air Quality**

An assessment of the potential impacts on local air quality from construction activities on the proposed development has been carried out using qualitative assessments and detailed modelling exercises as appropriate.

#### *Construction*

The assessment has indicated that during demolition and construction site activities releases of dust and PM<sub>10</sub> are likely to occur. However, the impact of dust and PM<sub>10</sub> releases will be reduced and excessive releases prevented through good site practice and the implementation of suitable mitigation measures. During construction it is intended that the contractor would follow the guidelines set out in the Considerate Constructors Scheme (CCS). The aims of the scheme are to minimise any disturbance or negative impact from the construction process. Furthermore a Construction Environmental Management Plan (CEMP) would be implemented to minimise environmental impacts. Mitigation measures included in the CEMP will be based on the Best Practice Guidance produced by the London Councils which include for example:

- Covering vehicles carrying loose aggregate and workings;
- implementation of design controls for construction equipment and vehicles and use of appropriately designed vehicles for materials handling;
- regular inspection and, if necessary, cleaning of local highways and site boundaries to check for dust deposits (and removal if necessary);
- use of mobile or fixed spray units to dampen surfaces as dictated by weather conditions; and
- use of dust-suppressed tools for all operations.

Implementation of the recommended dust prevention and control measures would ensure that dust emissions are controlled to a level where the potential of the surrounding sensitive areas to be affected by dust nuisance would be minimal temporary, short and local in effect. The residual effects of the dust deposition during the construction phase are considered to range from minor adverse to insignificant.

During construction, the increase in traffic emissions will be variable during the construction phases and only likely to impact areas near the principle means of access to the Site. Any adverse effects resulting from emissions of PM<sub>10</sub> during the construction period and emissions from construction vehicles are likely to be temporary, short to medium term and minor adverse to insignificant.

#### *Operation*

Dispersion modelling carried out for the assessment indicates that the development, at worst, would cause a small increase in pollutant concentrations but would not cause any exceedences of the statutory objective. According to the assessment significance criteria the impact of the proposed development is considered to be insignificant for NO<sub>2</sub> and insignificant to neutral for PM<sub>10</sub>. Air quality impacts during site operation will be mitigated by the implementation of a Green Travel Plan, provision of pedestrian and cycle access, proximity to public transport and local amenities (see section 3.4).

### **3.7.3. Contaminated Land**

A Land Contamination Assessment has been carried out for the site which states that, “the use of a ‘residential with plant uptake’ end use is appropriate”. The ground investigation identified that although there were high concentrations of hydrocarbons found within the ground, “the previous investigation did not identify any contamination to be present and no visual or olfactory evidence was noted during the course of [the present] investigation”. Therefore it is likely that the maximum concentrations identified are “as a result of the presence of tarmac or clinker within the sample and should not represent a cause for concern”. There may be a need for additional sampling and testing for contamination in light of the high concentrations of hydrocarbons.

#### **3.7.4. Noise Pollution**

Some noise and vibration may occur from demolition and construction activities, which could cause nuisance to local residents. These effects would be temporary and would be managed under the CCS, for example by controlling working hours, using quiet machinery and providing noise barriers for the site as appropriate.

The Proposed Development is not expected to generate significant volumes of noise during operation, as there is no noisy plant on site.

Future residents of the Proposed Development may be exposed to traffic noise from roads adjacent to the site, although there is existing residential accommodation along Elizabeth Way, where the highest noise levels have been identified. Mitigation measures to address this potential noise exposure may include:

- Specification of glazing building materials to attenuate noise and vibration where practical, dictated by the night time instantaneous noise events;
- Mechanical ventilation provided to units where noise levels are highest, so that windows can remain closed (subject to a detailed assessment);
- Noise design criteria specified to limit the overall and cumulative level of noise.

#### **3.7.5. Odour Pollution**

It is not considered likely that the Proposed Development will create nuisance from odours. Any potential odour issues associated with construction will be controlled via the CEMP and CCS. From the ground investigation that has been undertaken, no olfactory evidence of contamination was identified.

### **3.8 Climate Change**

The Cambridge Council SPD states that it is anticipated that the climate in the East of England will change in three main ways:

- Increases in temperatures (hotter summers, milder winters)

- Increases in seasonality (e.g. drier summers, wetter winters)
- Increases in the intensity and frequency of storm events

As stated in section 3.4, the Proposed Development has incorporated improvements to the building envelope and efficient heating systems to help mitigate the effects of climate change.

The minimum floor levels of the Proposed Development are to be set well above the predicted 1 in 100 year flood levels from the River Cam, thereby ensuring that the buildings and their occupants remain free from flood risk during the 1 in 100 year event for the lifetime of the development. Should the site be affected by a more extreme event, safe access routes are available to Newmarket road and Elizabeth Way, to the south and east respectively.

The Drainage Strategy has been designed to provide a minimum 65% reduction of surface water discharge, and does not flood for all rain events including the 1 in 100 year + 30% event thereby offering betterment over the existing conditions, this conferring additional protection against wetter winters and storm events.

An increase in tree planting across the site in strategic sustainable locations, and provision of landscaping may mitigate the urban heat island effect and help to serve as windbreaks.

### **3.9 Water**

The private flats and houses have a water consumption target of 105 litres/person/day, as required under the Code for Sustainable Homes Level 3. The following indicative specification could be used to achieve this target: a 4/2 litre dual flush toilet; washbasin and kitchen tap flow rates of 3 litres/min, shower 9 litres/min; bath (small) 150litres; best practice washing machine (45 litres per cycle) and best practice dishwasher (11 litres per cycle).

The student accommodation will incorporate water saving features such as dual flush toilets (6/4 litre), aerated taps and low flow showers (9litres/min).

The water supplies will be metered to encourage responsible use, and a leak detection system installed to identify water losses. The external planting will be designed to include species that require low levels of irrigation, and rainwater will be captured to provide irrigation for the site.

Residents will be issued with a Building User Guide (BUG) which will include a section on the water management initiatives.

### **3.10 Materials & Construction Waste**

A number of measures have been identified to maximise the use of materials from sustainable sources and with an inherently low impact on the environment, these include:

- Sourcing all structural timber from environmental certification schemes such as the Forest Stewardship Council. Other building materials will be responsibly sourced where practical;
- Sourcing materials locally where possible;
- Insulation materials containing substances known to contribute to stratospheric ozone depletion or with the potential to contribute to global warming would not be used;
- Where feasible using paints and varnishes with low Volatile Organic Compounds (VOC) content; and
- Inert and low emission finishes, construction materials, carpets, and furnishings would be used wherever practical.

Furthermore during construction, materials will be carefully stored and protected on site to prevent accidental damage and wastage.

### **3.11 Historic Environment**

An Archaeological Assessment has been carried out for the site and has not identified any potentially significant issues. A watching brief will be maintained during construction to safeguard any unknown buried artefacts.

# 4 CONCLUSION

---

This Statement demonstrates that the Proposed Development responds to the Cambridge Local Plan 2006, contributes to the sustainable development of the local area, and is considered to fulfil a number of Sustainable Design and Construction principles, as set out in the SPD.

The development has been designed to meet, or exceed, the policies set out in the Cambridge Local Plan 2006, specifically those listed in section 2.4 of this report, and is primarily in line with the guidance and checklist given within the Supplementary Planning Document, as is detailed in sections 3 and 5 (Sustainability Checklist) respectively.

The Local Plan should be seen in the context of Sustainable Development policies developed at an international, national, regional and local level.

In summary the key aspects that would make the Proposed Development be considered 'Good Practice' in terms of sustainable development are:

- Reuse of a Brownfield site;
- Provision of high quality, private and student housing;
- Reduced reliance on the car due to high pedestrian permeability, provision of cycle links and substantial storage, potential car sharing initiatives, home office area and proximity to public transport and amenities;
- Implementation of drainage strategy to reduce surface water run-off by over 50%;
- Energy efficient building fabric and design;
- Energy efficient systems and appliances such as low energy internal and external lighting; localised lighting and heating controls; A and A\* rated white goods; and provision of drying spaces.
- Onsite renewable energy generation, sufficient to reduce carbon dioxide emissions in excess of 10%;
- Provision of internal and external recycling facilities

for residents;

- Safeguarding and enhancing ecological features and biodiversity on site;
- Lighting strategy to enhance amenity for pedestrians and cyclists whilst avoiding unwanted light spill;
- Compliance with Considerate Contractors Scheme, Construction Environmental Management Plan and adoption of best practice policies;
- Specification of water saving devices to significantly reduce water consumption in the Scheme;
- Provision of internal and external waste separation and storage areas to encourage recycling;
- Facilitation of construction waste minimisation and recycling through Site Waste Management Plan and procurement strategy;
- Commitment to achieve Code for Sustainable Homes Level 3 for residential units;
- Commitment to achieve BREEAM 'Very Good' rating for student units.

# 5 SUSTAINABILITY CHECKLIST

This Section provides a summary of how the Proposed Development addresses Cambridge City Councils Supplementary Planning Guidance on Sustainable Design and Construction and the CCC Local Plan (2006) policies

on sustainable Development. A reference to the appropriate evidence in the text above is provided.

Theme	Stage	Dev Stage	Checklist	Location in Statement
<b>Transport</b>	Outline/Full	All	Have you demonstrated that the development is in the most suitable location for access by public transport, walking and cycling?	3.1.2
			Have you demonstrated how the design of the development helps reduce the need to travel, especially by private car?	3.2
			Have you demonstrated how the development proposals give priority for walking and cycling over cars?	3.2.1
			Do the development proposals for walking and cycling link with the surrounding walking and cycling network?	3.2.1
			Are existing walking and cycling routes retained, and improved where possible?	3.2.1
			Will the proposed walking and cycling provision be in place by first occupation of the development so that sustainable travel patterns can be established at an early stage?	3.2.1
			Do the development proposals provide cycle parking in accordance with the Local Plan Parking Standards (Local Plan Appendix D), in number, location and design?	3.2.1 3.2.4
			What is the car parking strategy?	3.2.4
			Does the transport provision conform to established good practice, particularly in terms of wildlife and landscape factors, so that any adverse impact is minimised?	3.2.1
			Have any 'softer' measures been included, to encourage uptake of more sustainable modes of transport?	3.2.1
			Does the development inhibit the expansion of high quality public transport routes?	3.2.3
		Are the development proposals accessible to those with impaired mobility?	3.2.1 3.2.4	
		Com	For non-residential proposals likely to attract a large number of trips, has the sequential approach been followed? (i.e. preference is given to a more central location)	N/A
<b>Transport (ctd.)</b>	Outline/Full	Com	If appropriate, has proper consideration been given to the	N/A

# SUSTAINABILITY CHECKLIST

Theme	Stage	Dev Stage	Checklist	Location in Statement
			potential for movement of goods and materials by rail or water?	
		Res	If the development is within an urban extension area, is it served by a high quality public transport service (as defined by the Local Plan), within a 400 metre walk of all new housing?	3.2.3
<b>SUDS</b>	Outline/Full	All	Has adequate information been provided in response to questions 1-3 of the Design Accreditation Checklist? (See Appendix B)	3.3
ESSENTIAL Urban Extensions Only			Has sufficient technical information from the Design Information Checklist been provided? (See Appendix B)	3.3
RECOMMENDED All Other Major Applications			Have sufficient soakage tests been carried out on site?	N/A
SPD Section 2.3			Does the proposal meet the principles set out in the Design Principles section of Section 7 of the SPD?	3.3
	REM/Full		Has the information in questions 4-8 of the Design Accreditation Checklist been provided? (See Appendix B)	3.3
			Does the proposal meet the principles set out in the Design Principles section of Section 7 of the SPD?	3.3
			Has a proposal for the long term maintenance of the SUDS scheme been provided?	3.3
<b>Energy</b>	Outline	All	Has the 10% CO2 reduction required been established using the most appropriate benchmark(s)? (Please convert C to CO2)	3.4
ESSENTIAL All Major New Developments			Has all onsite energy been included, including process energy where applicable?	
RECOMMENDED All Other Major Applications			Has the Energy Statement form provided been completed? (Appendix C1)?	3.4 Section 5
SPD Section 2.4			Has initial feasibility work into renewable options for the development been provided?	3.4.3 Section 11
	REM/Full	All	Has evidence of the SAP and/or SBEM calculations for the development been provided, with a revised calculation of the 10% CO2 reduction required? (This can also include revised calculations for all other applicable onsite energy uses)	3.4 Section 15
			Has the contribution that passive solar design will make to the energy requirements of the development been provided? (optional)	3.4 Section 9
			Has it been indicated which technology(s) has been chosen and demonstrated how this/these meet the agreed 10% CO2 reduction?	3.4.3
			Has visual information been provided to show how the	3.4.3

# SUSTAINABILITY CHECKLIST

Theme	Stage	Dev Stage	Checklist	Location in Statement
			technology(s) has/have been successfully integrated into the development?	Drawings
<b>Recycling and Waste Facilities</b>	Outline/Full	Res	Have the size and location of recycling and waste facilities, both for storage and collection, been provided?	3.5
ESSENTIAL All Major Applications SPD Section 2.5	REM/Full		Has a break down of the type of development, the number and type of units, and the predicted occupancy been given, upon which the provision of facilities has been calculated?	3.5
			Has a breakdown of the number and type of receptacles at each location been provided?	3.5
			Has a break down of the facilities that are being provided for each of the 4 waste streams for each person occupying the Proposed Development been provided?	3.5
			Has at least one clear route for the largest collection vehicle to access all the collection points around the site been demonstrated, with dimensions of roads and turning circles where necessary also indicated?	3.5.3
			Has it been shown that the average and maximum distances for building users to move their waste to the storage/collection points is within the guidelines set out in the guidance? If these targets are exceeded has justification and mitigation measures been proposed?	3.5
<b>Municipal Waste and Recycling</b>	Outline/Full	<del>Com</del>	Have the size and location of recycling and waste facilities, both for storage and collection, been provided?	3.5
ESSENTIAL All Major Applications SPD Section 2.5	REM/Full		Has information been provided on the maximum likely occupation of the development on which the calculations have been based?	3.5
			Has it been demonstrated what the likely waste streams are likely to be and which of these can be recycled?	3.5
			Has it been demonstrated that the external storage area(s) are accessible by vehicle?	3.5
<b>Biodiversity</b>	Outline/Full	All	Has an appropriate survey been conducted, with sufficient detail given the nature and size of the site and the Proposed Development?	3.6
ESSENTIAL All Major Applications SPD Section 2.6			If a protected or priority species has been identified, has a specialist been engaged to conduct a detailed survey?	3.6
			Has all the relevant information from these surveys been provided?	3.6
			Has it been demonstrated how existing habitats and species have been protected through the proposed ecological and	3.6

# SUSTAINABILITY CHECKLIST

Theme	Stage	Dev Stage	Checklist	Location in Statement
			landscape strategy?	
			Has it been demonstrated how any potentially adverse effects have been mitigated?	3.6
			Has it been demonstrated that existing habitats have been enhanced and new ones have been created?	3.6
			Has it been demonstrated that adequate compensation measures have been proposed where it is agreed that damage is unavoidable?	3.6
	REM/Full		Has a suitable management and monitoring strategy for the site once completed been proposed?	3.6
<b>Pollution</b>  ESSENTIAL All Major Applications  SPD Section 2.7	Outline/Full	All	Has an assessment of the need for lighting been carried out and the principles of an external lighting strategy that meets the requirements of the policy been set out?	3.7.1
	REM/Full		Has a full and appropriate site survey been carried out?	3.7.1
			Has the proposed external lighting design been carried out in accordance with the guidance and principles set out in Section 2.7 of the SPD?	3.7.1
	Outline/Full		<i>If the answer to any of the questions 1-9 below is yes, then an Air Quality Assessment is likely to be required and further guidance should be sought from the Environmental Services Scientific Team (see section 2.7 of SPD)</i>	3.7.2
			1) Does the development provide more than 50 new parking spaces or more than 25 if it is within an existing AQMA?	Y 3.7.2
			2) Is the development within an AQMA and a sensitive development (Residential, school, healthcare, childcare etc.)?	Y 3.7.2
		C	3) Is the development a prescribed industrial process under the PPC regulations?	N/A
		All	4) Is the development a sensitive development close to an existing prescribed process	N
			5) Will the development significantly alter flows or speeds on busy roads greater than 10'000 vehicles per day or any road within an AQMA? Where 'significantly' is defined as including any of the following: <ul style="list-style-type: none"> <li>▪ Change in traffic volume of 2% AADT or 1% AADT within the AQMA</li> <li>▪ Change in average vehicle speed of 5kph or a significant increase in congestion</li> <li>▪ A change in the modal split to a greater percentage</li> </ul>	N

# SUSTAINABILITY CHECKLIST

Theme	Stage	Dev Stage	Checklist	Location in Statement
			of Heavy Duty Vehicles (HDVs) including buses	
			6) Is the development part of a major phased redevelopment?	N
			7) May the development create a street canyon or reduce dispersion of pollutants?	N
			8) Will the development significantly alter the road or rail network?	N
			9) Will the proposals interfere with the Air Quality actions stated in the Local Transport Plan or Local Air Quality Action Plan?	N
			Is there a previous potentially contaminative use?	3.7.3
			If yes, has a desk top study been undertaken and included with the application?	N 3.7.3
			Has the potential impact of noise from the development or noise from adjoining sites which might affect the development been assessed?	Y 3.7.4
			Has the impact of construction noise been assessed and mitigation proposed?	3.7.4
	REM/Full		Has the impact of dust been assessed and mitigation proposed?	3.7.2
			Has the impact of odour been assessed and mitigation proposed?	3.7.5
<b>Climate Change</b>	Outline/Full	All	How have the layout, orientation and any landscaping proposals for the development taken into account predicted climate change impacts?	3.8
RECOMMENDED All Major Applications SPD Section 3.1			What other measures have been incorporated into the development to enable it to adapt to cope with predicted climate change impacts, without increasing use of energy consuming ventilation and cooling?	3.8
<b>Water</b>	Outline/Full	Res	Has a target been set for the reduction of water consumption for the development? (Equate to Code for Sustainable Homes if possible)	3.9
RECOMMENDED All Major Applications SPD Section 3.2		Com	Has a target been set for the reduction of water consumption for the development? (Equate to appropriate benchmark or percentage reduction over any statutory requirement, where relevant)	N/A
	REM/Full	All	Does the proposal demonstrate how the target agreed at outline will be met?	3.9
			Have measures been proposed that encourage more responsible and aware water behaviour from building occupants?	3.9

## SUSTAINABILITY CHECKLIST

Theme	Stage	Dev Stage	Checklist	Location in Statement
<b>Materials and Construction Waste</b>  RECOMMENDED All Major Applications  SPD Section 3.3	Outline/Full	Res	Has a target been set for improving the environmental impact of materials used in constructing the development? (Equate to Code for Sustainable Homes if possible)	3.1.3
		Com	Has a target been set for improving the environmental impact of materials used in constructing the development? (Equate to appropriate tool or assessment method if possible)	N/A
	REM/Full	All	Does the proposal demonstrate how the target agreed at outline will be met?	3.1.3

### Notes

Dev Type: Development Type (e.g. residential or non-residential)

Res: Residential uses

Com: Commercial/Non-Residential uses

All: All qualifying major residential and non-residential

Outline: Outline submission stage

REM: Reserved Matters submission stage

Full: Full submission stage

## Appendix C2: Energy Statement (Reserved Matters/Full Application)

Applicant Name: Berkeley Homes Capital

Application type: Full

Use Class: Residential

Proposed floor area: Residential led mixed use (20,890 square metres)

### Part 1: Carbon Emissions for Buildings from SAP/SBEM Calculations (Please include SAP/SBEM Certificate)

<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
Development Type:	SAP/SBEM Kg/CO2/m2/annum	Proposed area (m2)	Total Kg/CO2 per annum	10% minimum (kg/CO2 per annum)
Residential & Student Accommodation	<b>20.21</b>	<b>20,890</b>	<b>422,251</b>	<b>42,225</b>

### Part 2: Calculation of Carbon Emissions for Other Onsite Energy Uses (eg car park lighting, street lighting)

<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>
Other onsite energy use:	Reference where more detailed calculation can be found	Total Kg/CO2 per annum	10% minimum (kg/CO2 per annum)
	Section 14	504,306	50,430

Please provide a reasonable estimate for all other onsite energy uses, such as street lights, car park lighting, heating and lighting of communal areas and lifts. A breakdown of your calculations should be provided and added to the total for the building loads. The final total should be entered in the box right:

Total (kg/CO2 per annum) for parts 1 & 2 above: **926,557**

10% (kg/CO2 per annum) for whole development: **92,655**



# ENERGY STRATEGY

---

## Energy Strategy

Revision Number B

February 2009

<b>Date</b>	<b>Revision</b>	<b>Status</b>	<b>Comment</b>	<b>Q/A</b>
02/05/2008	-	Preliminary	Internal Discussion within design team only	307-140/19.1
13/05/2008	A	Draft	For comment	307-140/19.1
06/02/2009	B	Draft	For comment	307-140/19.1

# 6 EXECUTIVE SUMMARY

---

Berkeley Homes have proposed a residential led mixed-use scheme to include 195 apartments, 10 townhouses, 251 student rooms (to be provided in lieu of Affordable Housing) community café, new public thoroughfare and associated works. The proposed development is situated at Newmarket Road, Cambridge.

This document responds to planning policy in respect of energy consumption and carbon emissions. The methodology used herein is consistent with the guidance supplied in the Cambridge City Council SPD on Sustainable Design and Construction (paragraph 2.4.9), which follows the London Renewables Toolkit (LRT) and is also consistent with Part L of the Building Regulations.

The Energy Strategy shall address the residential and student accommodation separately, as separate sites, however both individual elements shall meet the planning objectives.

## **Residential**

Having considered all available renewable energy technologies for the Brunswick Site, and discounted those that were deemed inappropriate for this city centre location, we have looked in detail at providing the target reductions in CO<sub>2</sub> emissions using a combination of Solar Hot Water (SHW) panels and a gas-fired Combined Heat & Power (CHP) plant.

The Proposed Development features the following energy-saving measures for the private residential units and houses:

- Glazing U-value of 1.35 W/m<sup>2</sup>K
- Ground Floor U-value of 0.2 W/m<sup>2</sup>K
- External Walls U-value of 0.2 W/m<sup>2</sup>K
- Roof U-value of 0.15 W/m<sup>2</sup>K
- Accredited construction details (to minimise thermal bridging)
- Improved air tightness to 6 m<sup>3</sup>/hr m<sup>2</sup>
- Low Energy Lighting to at least 50% of apartment lighting
- Gas-fired condensing boilers with a minimum boiler seasonal efficiency of 90% and programmer, room thermostat and Thermostatic Radiator Valves (TRVs) in each flat.

The energy saving measures will be used to reduce the dwelling Carbon Dioxide Emissions Rate and to achieve Part L1A compliance.

In order to meet the minimum 10% reduction in carbon dioxide emissions, which includes all on site energy uses as specified by Cambridge City Council in their guidance and further to achieve a 25 % in carbon dioxide emissions for Code for Sustainable Homes level three compliance, the following is required;

- 356m<sup>2</sup> of Solar Thermal Panels and 6kWe/17KWt Combined Heat and Power (CHP).

### **Student Accommodation**

UNITE have provided slightly different energy saving measures for the student accommodation block. However, these energy saving measures will also be used to reduce the dwelling Carbon Dioxide Emissions Rate and to achieve Part L2A compliance.

- Glazing U-value of 1.9 W/m<sup>2</sup>K
- Ground Floor U-value of 0.2 W/m<sup>2</sup>K
- External Walls U-value of 0.2 W/m<sup>2</sup>K
- Roof U-value of 0.15 W/m<sup>2</sup>K
- Accredited construction details (to minimise thermal bridging)
- Improved air tightness to 5 m<sup>3</sup>/hr m<sup>2</sup>
- Gas-fired condensing boilers with a minimum boiler seasonal efficiency of 90% fed to a thermal store to provide domestic hot water. A programmer, room thermostat and thermostatic radiator valves (TRVs) shall be each flat linked to electric space heating.

In order to meet the minimum 10% reduction in carbon dioxide emissions, which includes all on site energy uses as specified by Cambridge City Council in their guidance, the following option has been deemed viable for this development:

- A total of 187m<sup>2</sup> Solar Hot Water (SHW) panels installed at the development, with all units supplied by electricity for heating and gas for DHW demand to achieve 10.0% reduction in on site CO<sub>2</sub> emissions.

# 7 INTRODUCTION

---

Berkeley Homes have proposed a residential led mixed-use scheme that includes 195 apartments, 10 townhouses, 251 student rooms (to be provided in lieu of Affordable Housing) community café, new public thoroughfare and associated works. The proposed development is situated at Newmarket Road, Cambridge.

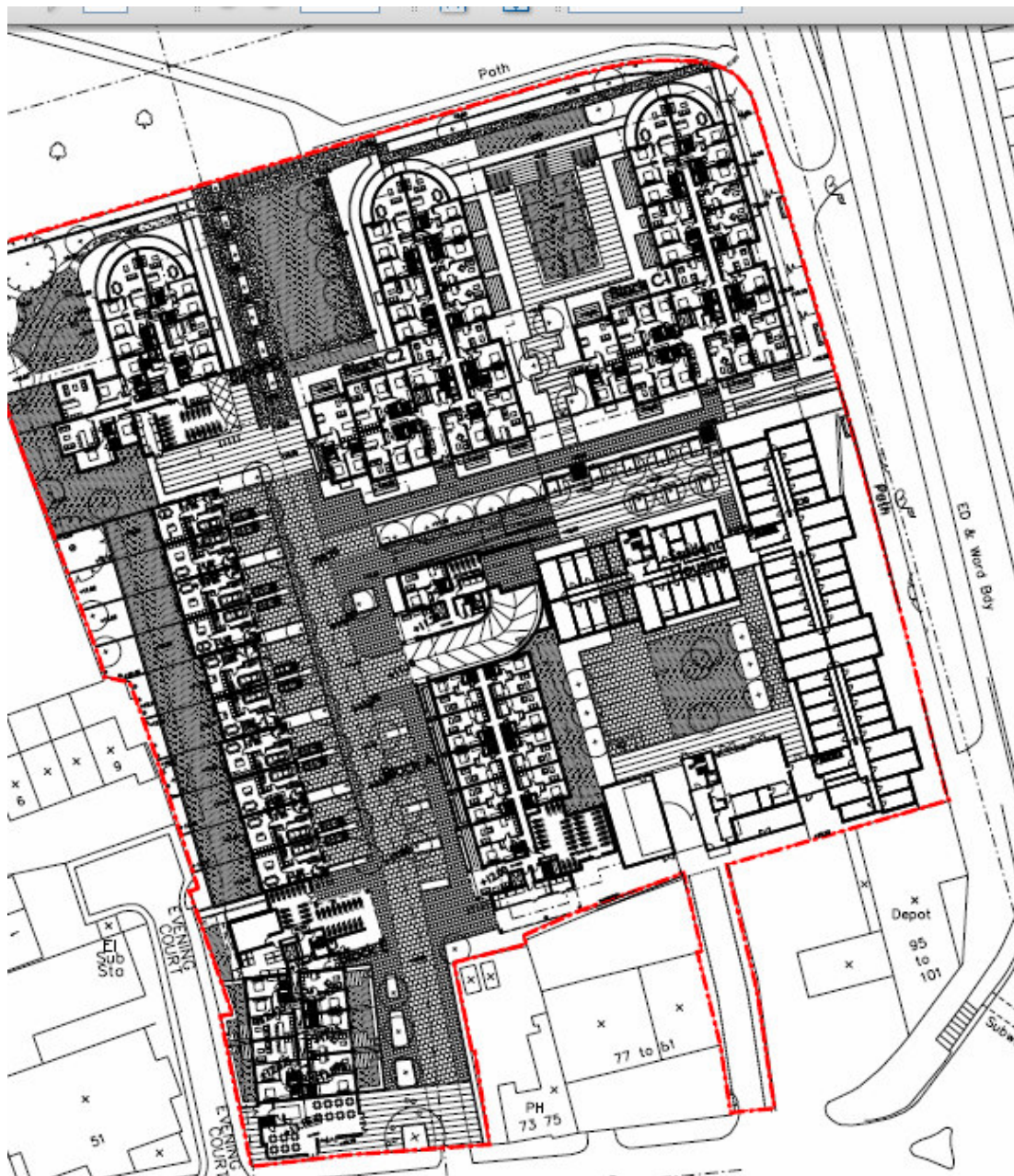


Figure 2 – Brunswick Site Plan, Cambridge

Areas of buildings at the development used for calculations within this study were as follows:

Houses	total	2036	m <sup>2</sup>
Residential Buildings	total dwelling area	16053	m <sup>2</sup>
Student Accommodation	total	4837	m <sup>2</sup>

## Planning Policy Context

### National

Guidance supplied in the Cambridge City Council SPD on Sustainable Design and Construction (paragraph 2.4.9), suggests using the hierarchy of feasible energy options similar to those given within the London Renewables Toolkit (LRT) and is also consistent with Part L of the Building Regulations. The following description is taken from the London Renewables Toolkit.

“Increased development of renewable energy resources is vital to facilitating the delivery of the Government’s commitments on both climate change and renewable energy. The Government’s Energy Policy, including its policy on renewable energy, is set out in the Energy White Paper. This aims to put the UK on a path to cut its carbon dioxide emissions by some 60% by 2050, with real progress by 2020, and to maintain reliable and competitive energy supplies. As part of the strategy for achieving these reductions the White Paper sets out:

- The Government’s target to generate 10% of UK electricity from renewable energy sources by 2010
- The Government’s aspiration to double that figure to 20% by 2020 and suggests that still more renewable energy will be needed beyond that date.

“The Energy White Paper indicated that the Government would be looking to work with regional and local bodies to deliver its objectives, including establishing regional targets for renewable energy generation. Regional Planning Guidance should include the target for renewable energy generation for its respective region, derived from assessments of the region’s renewable energy resource potential.”

*Planning Policy Statement 22* (PPS 22 – Renewable Energy) sets out the Government’s national policy for renewable energy, in terms of both dedicated renewable generation projects (e.g. wind farms) and ‘embedded’ generation. It states that “local planning authorities may include policies in local development documents that require a percentage of the energy to be used in new residential, commercial or industrial developments to come from on-site renewable energy developments. Such policies:

- (i) Should ensure that requirement to generate on-site renewable energy is only applied to developments where the installation of renewable energy generation equipment is viable given the type of development proposed, its location, and design;
- (ii) Should not be framed in such a way as to place an undue burden on developers, for example, by specifying that all energy to be used in a development should come from on-site renewable generation.

### Regional and Local

The Cambridge Local Plan (2006) policy 8/16 states that “Developers of major proposals above a threshold of 1,000 square metres or 10 dwellings will be required to provide at least 10% of the development’s total predicted energy requirements on-

site, from renewable energy sources. These requirements may be relaxed if it can be clearly demonstrated that to require full compliance would not be viable”.

Within the Cambridge City Councils Supplementary Planning Document (SPD) on Sustainable Design and Construction (June 2007), it is stated that the renewable energy systems that will be considered include:

- Solar thermal hot water systems
- Photovoltaic cells (PV)
- Wind turbines
- Heat pumps (ground/air/water source)
- Geothermal
- Biomass (boilers/stoves/community heating/CHP)
- Anaerobic digestion

All of the above renewable energy systems have been considered in the preparation of this report. Those energy systems not considered to be viable have however been discounted. Reasons why these technologies were not considered are provided in section 11.

In specific reference to Combined Heat and Power (CHP), the SPD states that, “If the CHP is powered by fossil fuels it cannot be considered a renewable. Applicants [considering installing CHP] are advised that each case will be assessed on its own merits, depending to some extent on the scale of the CO<sub>2</sub> emissions savings that are likely to be achieved with the proposed fuel”. BHSEL have tried to reduce carbon emissions through the installation of biomass plant, but this has been declined by Cambridge City Council on the grounds of poor air quality standards from resultant particulate and NO<sub>x</sub> emissions.

BHSEL are also committed to reaching Code for Sustainable Homes Level 3, which amounts to a 25% reduction in carbon dioxide emissions when compared to Part L target emissions. This level will be met through a combination of energy saving measures and renewable energy technology.

# 8 METHODOLOGY

---

This report draws on the information and approach set out in the LRT, as defined in section 2.4.9 of the CCC SPD on Sustainable Design and Construction (June 2007). The currency used for emissions is carbon dioxide, rather than the carbon equivalent, for consistency with Part L of the Building Regulations.

Benchmark data is used, where available, to establish energy demand by end use, e.g. heating, hot water, lighting. (Where a breakdown by end use is not available it is sometimes been possible to calculate certain end uses by using the benchmark figures for renewables in the LRT).

This enables the end uses controlled by Part L of the Building Regulations to be separated from other end uses, which are essentially those that the design team has little control over. It should be noted that the percentage emissions savings targeted by planning policy, unlike the Building Regulations, typically relate to all end uses.

A Part L analysis is conducted to calculate carbon dioxide emissions for the following end uses: heating; hot water; cooling; fans, pumps and controls; and lighting. The National Home Energy Rating (NHER) scheme software is used to estimate consumption for all residential units and housing. IES software is used to provide energy demand for the student units. Allowances are made for lighting and power for communal areas, and lifts.

Various energy-saving measures are considered in terms of technical and economic feasibility and their effect on carbon dioxide emissions. A package of energy-saving measures is proposed that meets the Part L standard, without reliance on the contribution of renewable energy technologies.

In line with CCC guidance and the requirements of CCC Appendix C2 within the SPD, a reasonable estimate has been made for all other onsite energy uses such as communal area lighting, car park lighting and ventilation, lifts and external lighting. This has been added to the site total (see Section 14)

The site was considered in two sections: housing and residential flats; and student accommodation. Each of these sections was modelled for energy use and heat losses. A preliminary assessment was carried out investigating what renewable technologies would be suitable for use at the development. The student accommodation calculations have been designed to 256 units, following a late decision the actual number of units shall be 251 resulting in the calculations marginally over sizing energy demand and carbon dioxide emissions.

A preliminary assessment of renewable technologies for the housing and residential has been carried out, a detailed assessment of solar water heating was investigated and initially sized to reduce CO<sub>2</sub> emissions by at least 10% to the base case scenario and to meet approximately 50% of the domestic hot water (DHW) demand.

In parallel to the investigation of renewable energy technology, all units were technically and economically investigated for the installation of a natural (mains) gas fired combined heat and power (CHP) unit.

Subsequently, a combination of gas CHP and solar hot water (SHW) panels was investigated. With this option, the SHW is designed to meet the targeted 25% CO<sub>2</sub> emissions reduction for Code for Sustainable Homes level 3 compliance.

For the student accommodation electric space heating was investigated and the subsequent effect this has on the SHW area required to meet the targeted 10% CO<sub>2</sub> emissions reduction with no gas fired CHP installed.

Calculations are presented in summary form in subsequent sections. Full calculations are available on request.

# 9 ENERGY DEMAND

---

## **Residential Development**

The development would feature energy saving measures such that compliance with Part L of the Building Regulations would be achieved without reliance on the contribution of renewable energy technologies. As the development consists of residential properties, Part L studies have been undertaken to demonstrate compliance with Part L1A.

Part L1A calculations have been undertaken for the houses and flats within the development using the NHER software, which is accredited for this use. The minimum requirements for compliance with Part L1A were established, and feasible improvements included to further reduce the carbon dioxide emissions. The measures outlined below have been used in the NHER calculations, and exceed the requirements of Part L1A:

- Glazing U-value of 1.35 W/m<sup>2</sup>K;
- Door U-value of 2.2 W/m<sup>2</sup>K;
- Ground Floor U-value of 0.2 W/m<sup>2</sup>K;
- External Walls U-value of 0.2 W/m<sup>2</sup>K;
- Roof U-value of 0.15 W/m<sup>2</sup>K;
- Air permeability of 6 m<sup>3</sup>/hr m<sup>2</sup>.
- Gas-fired condensing boilers with a minimum boiler seasonal efficiency of 90% and programmer, room thermostat and Thermostatic Radiator Valves (TRVs) in each flat.

The NHER software has been used for the calculations, which also provides benchmark data on carbon dioxide emissions from cooking and the use of appliances within the dwellings. These figures have been added to the Part L1A calculation results to establish the total carbon dioxide emissions of the dwellings.

The carbon dioxide emissions relating to the communal lighting and power in the stairwells are included for the 'Other Electrical Demand' within the appended calculations, in order to provide a complete assessment of the development's carbon footprint. A 50% level of low energy lighting is used in the NHER calculations.

## **Student Accommodation Development**

Part L2A calculations have been undertaken for the student units within the development using the IES software, which is accredited for this use. The minimum requirements for compliance with Part L2A were established, and feasible improvements included to further reduce the carbon dioxide emissions. The measures outlined below have been referred to RYB by UNITE and Stride Treglown. The measures outlined below are also used in the IES calculations, and exceed the requirements of Part L2A:

- Glazing U-value of 1.9 W/m<sup>2</sup>K;
- Ground Floor U-value of 0.2 W/m<sup>2</sup>K;
- External Walls U-value of 0.2 W/m<sup>2</sup>K;
- Roof U-value of 0.15 W/m<sup>2</sup>K;
- Air permeability of 5 m<sup>3</sup>/hr m<sup>2</sup>;
- Gas-fired condensing boilers with a minimum boiler seasonal efficiency of 90% fed to a thermal store for domestic hot water. A programmer, room thermostat and thermostatic radiator valves (TRVs) shall be each flat linked to electric space heating.

Through energy saving measures alone we predict that the site as a whole will produce 169 tonnes CO<sub>2</sub> per year less than an equivalent notional building.

# 10 COMBINED HEAT AND POWER

---

Combined heat and power (CHP) is considered a viable option for the Berkeley Homes (Capital) site. In this case, the CHP could be sized to meet the base DHW load, whilst meeting the greatest possible electrical load. A gas CHP system has been investigated to supply the residential flats.

The Gas CHP unit considered is an EC Power XRGI15 unit 6 kWe/17 kWt unit. This unit has a 6kWe output, 17kWth output and 26kW input.

Using standard domestic hot water (DHW) demands noted within the Plumbing Engineering Services Design Guide, the daily hot water demand has been calculated and is attached in Section 13.

All residential flats were considered for connection to the gas CHP. The aim should be to size the system to maximise the run hours of the CHP. This requires the gas CHP unit to run for 21 hours per day to meet approximately 50% of the hot water demand of all the private residential and student accommodation.

The Gas CHP unit can potentially produce 6kW of electrical power if the CHP were to run at full load for 24 hours a day. Preliminary calculations indicate that the development could utilise 100% of the 6kWe output. Currently the CHP unit will run for 21 hours/day, therefore the majority of the background electrical load will be met. The background electrical load considered consists of communal lighting and power in all blocks and the basement car parks, as well as an allowance for electrical loads within the student accommodation units. The CHP unit does not meet the electrical demand of any mechanical ventilation system within the car park under guidance of building regulations Part B.

Using an arrangement whereby the gas CHP runs for 21 hours/day to service all units at the development and meets 50% of the DHW demand, the gas consumed for hot water production would rise to produce an extra 10 tonnes of CO<sub>2</sub>, but this is balanced by a saving of 14 tonnes of CO<sub>2</sub> from the electricity which is displaced by the CHP units. The introduction of CHP could therefore save approximately 4 tonnes of CO<sub>2</sub> annually.

Unite have not included CHP as part of their energy strategy due Solar Hot Water being able to address the 10 % saving in carbon dioxide emissions objective and the hot water baseline demand not being high enough to justify a small scale CHP system.

# 11 RENEWABLE TECHNOLOGY OPTIONS

---

## Preliminary Appraisal

The following technologies were not considered to be appropriate to the Proposed Development:

- PV cells, on the basis of visual impact, insufficient roof space, and unsustainable cost;
- Wind, on the basis of visual impact, high acoustic impact, relatively low building height, and local topographic conditions;
- Ground Source Heat Pumps, on the basis of the risks relating to adequate flow rates and Environment Agency licensing, insufficient area being available for heat rejection in the ground, and unsustainable cost;
- Biomass Heating, on the basis of air quality issues, relatively high maintenance, and access roads and associated vehicle movements for frequent fuel deliveries to any biomass fuel store on site. Further to this, a meeting held with Cambridge City Council Air Quality advisors resulted in a specific request to exclude biomass boilers from the development;
- Biomass CHP, on the basis of embodied impacts, relatively high maintenance, fuel delivery access and vehicle movements, and it being an immature technology.

## Detailed Appraisal – Solar Water Heating

Solar hot water uses a heat collector, usually as panels on the roof, in which liquid is heated by the sun. The fluid is used to heat up water that is stored in either a separate hot water cylinder or a twin hot water cylinder. There are two types of solar collector: flat plate, and evacuated tubes, the latter being generally more efficient. Our preference would be to use evacuated tube SHW collector panels as these currently offer the most efficient and sophisticated technology.



Figure 3 – Example of evacuated tube solar collectors

There are a large number of manufacturers and suppliers; this strategy specifies Riomay Ecotubes which are evacuated tubes that can be laid flat. The tubes within the panel can be angled to maximise efficiencies. The manufacturer suggests that the average output is approximately 758 kWh/m<sup>2</sup> (when laid flat, tubes facing due South and spaced correctly to avoid overshadowing).

In order to investigate Solar Hot Water (SHW) as a renewable technology to use at the development, the site was investigated in 2 separate sections: housing and residential flats; and student accommodation.

Solar Hot Water panels will be installed to provide hot water to all residential flats at the development subject to detailed design. In all, 195 residential flats and 251 student accommodation units have been investigated for SHW to meet approximately half of the DHW demand. However the system can be individualised should the site be built in phases.

In order to meet Code for Sustainable Homes Level 3, all private residential units will have to reach a 25% reduction on their carbon dioxide emissions from the target emissions. Therefore the solar hot water heating will connect into a centralised thermal store and linked to a CHP for use by all residential units. Should the site be built in phases individual solar collectors will be installed and then linked to the thermal store sized to cope with the overall site demand. If built as a separate phase, the townhouses shall still comply with Code for Sustainable Homes Level 3. If solar thermal is deemed not appropriate, alternative systems such as exhaust air heat pumps which comply with the list of appropriate low/zero carbon technologies, shall be specified.

Table 1 overleaf shows the total carbon dioxide emissions reductions for each stage. All the options provide a CO<sub>2</sub> saving of at least 10%.

### **Residential Accommodation**

For the 195 residential flats and 10 houses, 356m<sup>2</sup> of SHW panels are required to achieve a 10.0% reduction of CO<sub>2</sub> emissions over the baseline mains gas scenario, and meet the requirements to satisfy Cambridge City Councils Policy 8/16. Should the development be built in phases the solar thermal systems can be individualised to have collectors on the designated roof space.

Installing and running a small 6kWe 17kWt gas CHP at the development, in combination with solar water heating reduces the SHW as carbon savings are in the order of 25%, and meets the requirements to satisfy Cambridge City Councils Policy 8/16, as well as reaching Code for Sustainable Homes Level 3.

### **Student Accommodation**

Within the student accommodation building, electrical heating was investigated. Secondly, SHW heating was investigated in order to meet the 10% CO<sub>2</sub> reduction target against both the gas and electrically heated building, although the SHW would offset the DHW demand, which is gas in both cases.

To reduce carbon dioxide emissions by over 10% against the gas base case scenario, 187m<sup>2</sup> of solar hot water panels are required.

**Table 1 – Total Carbon Dioxide emissions from houses, residential and student blocks (including allowances for lighting, cooking, appliances and ‘Other On-Site Energy Uses’)**

Design Stages	Carbon Dioxide Emissions (kg/CO2/yr)			
	FLATS AND HOUSES	Additional Information	STUDENT ACCOMADATION	Additional Information
Design Stage 1 – Energy Saving Measures (Gas)	583,174	Mains Natural Gas System	306,764	Electric heating system
10% CO2 reduction from design stage using SHW panels	524,857		276,035	
<i>CO2 Saving (%) to design stage</i>	<i>10</i>		<i>10</i>	
<i>SHW Panel Area (m2)</i>	<b>396</b>		<b>187</b>	
<b>Gas Fired CHP &amp; SHW panels</b>	<b>509,966</b>	6kWe, 17kWth CHP system running for 20 hours/day for residential		
<i>CO2 Saving (%) to design stage</i>	<i>25</i>			
<i>SHW Panel Area (m2)</i>	<b>356</b>			

\* - includes additional Carbon Dioxide emissions from ‘Other On-Site Energy Uses’ as defined in the Cambridge City Council SPD

# 12 CONCLUSION

---

From an analysis of the proposed development following the hierarchy detailed in the LRT (as recommended in the Cambridge City Council SPD), the following strategy is proposed for the development.

Energy saving measures will be used to make the building comply with Part L1A and Part L2A of the building regulations. These will include improved fabric performance and low energy lighting. These measures are predicted to provide a significant reduction in site CO<sub>2</sub> emissions.

In order to meet a 10% reduction in carbon dioxide emissions, as required by Policy 8/16 of the Cambridge City Local Plan 2006 the following are considered to be viable for this development:

- **Residential** – A total of 356m<sup>2</sup> SHW panels and a 6kwe 17kWt CHP are installed at the development, with all units supplied by mains gas for space heating and DHW demand – a total reduction of 25% in CO<sub>2</sub> emissions;
- **Townhouses** – Subject to being built as a separate phase, the townhouses shall comply by either solar thermal panels, as part of the site wide strategy, or by alternative systems that are appropriate for the Code for Sustainable Homes level 3, such as exhaust air heat pumps.
- **Student Accommodation** – A total of 187m<sup>2</sup> SHW panels are installed at the development, with all units supplied by electricity for space heating and gas for DHW demand – a total reduction of 10 % in CO<sub>2</sub> emissions.

# 13 ENERGY STRATEGY CHP CALCULATIONS

---

## 13.1.1. Residential Flats

	Studio / 1 Bed	2 Bed	3 Bed +	Houses	Total
Blocks	73	90	32	0	195
Houses	0	0	0	10	10
<b>Total</b>	73	90	32	10	205
Design <sup>1</sup> Daily Hot Water Use (litres)	115	75	55	55	n/a

**Table A1 – Schedule of rooms in residential flats**

The total daily DHW demand for all 195 flats and 10 houses is 17,455 litres.

$$\text{Total Daily Use} = 17,455 \text{ litres/day}$$

$$\begin{aligned} \text{Assuming a 24 hour profile, this equates to} &= 727.29 \text{ litres/hour} \\ &= 0.2020 \text{ litres/second} \end{aligned}$$

$$\begin{aligned} \text{The required heat input of } Q_{HW} &= m \cdot c_p \cdot \Delta T \\ &= 0.202 \times 4.2 \times 17 \\ &= 14.42 \text{ kW} \end{aligned}$$

$$\begin{aligned} \text{Therefore a CHP with a heat output of 17kW} &= Q_{HW} / (4.2 \times 55) \\ &= 17 / (4.2 \times 17) \\ &= 0.2381 \text{ litres/second} \\ &= 857.14 \text{ litres/hour} \end{aligned}$$

Therefore the CHP would operate for 20 hours a day to meet the full DHW demand.

---

<sup>1</sup> Plumbing Engineering Services Design Guide (2002)

# 14 ENERGY STRATEGY 'OTHER' ENERGY USE CALCULATIONS

---

## Cooking and Appliances

Calculated from NHER and IES (SAP calculations) results.

Total site kg/CO<sub>2</sub>/yr = 296,666

## Lift Use

Estimated building population of 800. 25% living on ground floor, therefore lift used by 600 people

Daily use of 4 times per day, 30 seconds duration. All lifts rated at 15kW

Total lift kg/CO<sub>2</sub>/yr = 46,209

## Communal Lighting

5 W/m<sup>2</sup>, utilised for 40% of the time (due to presence detection, etc.)

Total communal area 5,236m<sup>2</sup>

Total communal lighting kg/CO<sub>2</sub>/yr = 38,712

## External Lighting

5 W/m<sup>2</sup>, utilised for 50% of the time (due to daylighting hours, etc.)

Total external area 6,100m<sup>2</sup>

Total external lighting kg/CO<sub>2</sub>/yr = 32,408

## Car Park Lighting

2.5 W/m<sup>2</sup>, utilised for 40% of the time (due to presence detection, etc.)

Total car parking area 4,630m<sup>2</sup>

Total car park lighting kg/CO<sub>2</sub>/yr = 17,116

## Car Park Ventilation

Based on a volume of 11,800m<sup>3</sup> and 6 air changes per hour required.

Capacity of 10 ach in accordance with building regulations Part B.

Utilising a total of 30kW fans running 24 hours a day with a 66% diversity

Total car park ventilation kg/CO<sub>2</sub>/yr = 73,195

**TOTAL SITE 'OTHER' kg/CO<sub>2</sub>/yr = 504,306**

# 15 ENERGY STRATEGY SAP CALCULATION RESULTS

## Residential

Model	Gas Demand (MWh)					Electricity Demand (MWh)								Carbon Dioxide Emissions (t)		
	Space heating	Hot water	Sub-total (Part L)	Other	Total	Space heating	Hot water	Cooling	Fans, pumps and controls	Lighting	Sub-total (Part L)	Other	Total	Elec On-Site Generation	Total (Part L)	Total
<b>Benchmarked</b>	564	638	1,203	119	1,322	80	0	0	47	166	293	271	564	0	358	495
<b>Notional (Part L 2006)</b>																371
<b>Target (Part L 2006)</b>																297
<b>Stage 1 - Mains Gas Heating</b>	489	573	1,062	0	1,062	56	0	0	36	98	190	703	893	0	286	583
<b>Stage 2 - Gas CHP</b>	489	625	1,114	0	1,114	56	0	0	36	98	190	703	893	25	272	568
<b>Stage 3 - SHW</b>	489	272	761	0	761	56	0	0	36	98	190	703	893	0	228	525
<b>Stage 4 - Final</b>	489	324	813	0	813	56	0	0	36	98	190	703	893	25	213	510

Unite Student Accommodation

Model	Gas Demand (MWh)					Electricity Demand (MWh)								Carbon Dioxide Emissions (t)		
	Space heating	Hot water	Sub-total (Part L)	Other	Total	Space heating	Hot water	Cooling	Fans, pumps and controls	Lighting	Sub-total (Part L)	Other	Total	Elec On-Site Generation	Total (Part L)	Total
<b>Benchmarked</b>	654	739	1,393	138	1,531	93	0	0	54	192	340	314	654	0	414	573
<b>Notional (Part L 2006)</b>	410	620	1,029	0	1,029						340		654	0	343	476
<b>Target (Part L 2006)</b>															264	332
<b>Stage 1 - Mains Gas Heating</b>	190	359	548	0	548	19	0	0	4	121	144	159	303	0	167	234
<b>Stage 2 - SHW</b>	190	238	428	0	428	19	0	0	4	121	144	159	303	0	144	211
<b>Stage 3 - Electric Heating</b>	0	359	359	0	359	182	0	0	100	121	403	159	562	0	240	307
<b>Stage 4 - Electric Heating and SHW</b>	0	200	200	0	200	182	0	0	100	121	403	159	562	0	209	276
<b>Stage 5 - Elec Htg + SHW + CHP</b>	0	252	252	0	252	182	0	0	100	121	403	159	562	25	194	261
<b>Stage 5 - Elec Htg + CHP</b>	0	410	410	0	410	182	0	0	100	121	403	159	562	25	225	292

# PRELIMINARY CODE FOR SUSTAINABLE HOMES REPORT

---

## Preliminary Code for Sustainable Homes Report

Revision C

Feb 2009

<b>Date</b>	<b>Revision</b>	<b>Status</b>	<b>Comment</b>	<b>Q/A</b>
26/02/08	-	Preliminary	For comment	307-140-01
24/04/08	A	Preliminary	For comment	307-140-01
02/05/08	B	Draft	For comment	307-140-01
13/05/08	C	Draft	For comment	307-140-01
05/02/09	D	Draft	For comment	307-140-01

# 16 INTRODUCTION

## 16.1 Proposed Development

This Code for Sustainable Homes assessment relates to the private residential units of the development comprising 195 flats and 10 houses. The student accommodation is dealt with separately in the BREEAM Multi Residential Report.

The current score, assessed under the Code for Sustainable Homes, is 63.85% which equates to Code Level 3.

## 16.2 Code for Sustainable Homes

The Code for Sustainable Homes was launched in December 2006 with the publication of 'Code for Sustainable Homes: A step change in sustainable home building practice' (DCLG 2006). This introduced a single national standard to be used in the design and construction of new homes in England, based on the BRE's EcoHomes® scheme. Adoption of the Code is intended to encourage continuous improvement in sustainable home building.

The Code for Sustainable Homes is a set of sustainable design principles covering performance in nine key areas listed below:

- Energy and CO<sub>2</sub>
- Water
- Materials
- Surface water run-off
- Waste
- Pollution
- Health and well being
- Management
- Ecology

In each of these categories, performance targets are proposed which are in excess of the minimum needed to satisfy Building Regulations, but are considered to be sound best practice, technically feasible, and within the capability of the building industry to supply.

The Code uses a rating system of one to six stars, and it differs from EcoHomes in several key regards outlined below:

- It is assessed at the level of an individual 'Dwelling'
- It contains minimum mandatory standards for energy, water, materials, waste and surface water run-off, which must be met before even the lowest level of the Code can be achieved.
- It demands higher minimum standards for energy and water to be met before the higher levels of the Code can be achieved.
- It is performed in two stages with 'Final' Code certification taking place after a Post Construction Review has been carried out.

In addition to the mandatory requirements, each design category scores a number of percentage points. The total

number of percentage points establishes the 'star rating' for the dwelling.

Formal assessment of dwellings using the Code for Sustainable Homes may only be carried out using licensed and registered individuals, who are qualified 'competent persons' for the purpose of carrying out Code assessments. Training, registration and licensing of these individuals is carried out by the Building Research Establishment according to a UKAS registered 'competent persons scheme' and under ISO 14001 and 9001. BRE also carry out quality assurance of the assessments and issue certificates on behalf of the department of Communities and Local Government.

## 16.3 Scoring System

Credits are available for each issue meeting the specified levels of performance. The number of credits available in each category does not necessarily reflect the relative importance of the issues being assessed. Before the final score is calculated each of the scores in the nine category areas has a weighting factor applied before the final score is calculated.

The Code uses a rating system of one to six stars, with six stars being the best. The final rating is determined by the Code assessor and quality assured and certified by BRE.

Before a dwelling can start to be awarded points under the Code it must achieve minimum standards in the following categories:

- Embodied impacts of construction materials
- Surface water runoff
- Construction site waste management
- Household waste storage space and facilities

There are also targets for carbon dioxide emissions and potable water consumption for each Code Level.

**Table 1 Code Scale**

Rating	Requirements (equal to or greater than)
Level 1	36 Points
Level 2	48 Points
Level 3	57 Points
Level 4	68 Points
Level 5	84 Points
Level 6	90 Points

# 17 PRE-ASSESSMENT SUMMARY

Issue	Credits	Dwelling																																													
Energy																																															
<b>Ene1</b>	<p><b>% DER improvement over TER</b></p> <p>Credits are awarded based on the percentage improvement of the Dwelling Emission Rate (DER) over the Target Emission Rate (TER) as calculated using SAP 2005. Minimum standards for each Code level apply.</p> <ul style="list-style-type: none"> <li>• 10% improvement</li> <li>• 14% improvement</li> <li>• 18% improvement</li> <li>• 22% improvement</li> <li>• 25% improvement</li> <li>• 31% improvement</li> <li>• 37% improvement</li> <li>• 44% improvement</li> <li>• 52% improvement</li> <li>• 60% improvement</li> <li>• 69% improvement</li> <li>• 79% improvement</li> <li>• 89% improvement</li> <li>• 100% improvement</li> <li>• True Zero Carbon</li> </ul> <p><b>Assumptions made:</b> The energy strategy will ensure that there is a percentage reduction in the DER over the TER of greater than 25%, as necessary to meet the mandatory Code level 3 requirements.</p>	<table border="0"> <tr><td></td><td>1</td><td></td></tr> <tr><td></td><td>2</td><td></td></tr> <tr><td></td><td>3</td><td></td></tr> <tr><td></td><td>4</td><td></td></tr> <tr><td></td><td>5</td><td style="border: 1px solid black; text-align: center;">5</td></tr> <tr><td></td><td>6</td><td></td></tr> <tr><td></td><td>7</td><td></td></tr> <tr><td></td><td>8</td><td></td></tr> <tr><td></td><td>9</td><td></td></tr> <tr><td></td><td>10</td><td></td></tr> <tr><td></td><td>11</td><td></td></tr> <tr><td></td><td>12</td><td></td></tr> <tr><td></td><td>13</td><td></td></tr> <tr><td></td><td>14</td><td style="text-align: right;">(max 15)</td></tr> <tr><td></td><td>15</td><td></td></tr> </table>		1			2			3			4			5	5		6			7			8			9			10			11			12			13			14	(max 15)		15	
	1																																														
	2																																														
	3																																														
	4																																														
	5	5																																													
	6																																														
	7																																														
	8																																														
	9																																														
	10																																														
	11																																														
	12																																														
	13																																														
	14	(max 15)																																													
	15																																														
<b>Ene2</b>	<p><b>Building Fabric</b></p> <p>Credits are awarded based on the Heat Loss Parameter (HLP) obtained from the SAP 2005 calculations. This is based on the level of insulation provided in the dwellings.</p> <ul style="list-style-type: none"> <li>• Less than or equal to 1.30</li> <li>• Less than or equal to 1.10</li> </ul> <p><b>Assumptions made:</b> A HLP of less than 1.30 may be achieved, however this will not be confirmed until a later stage in the design process; and therefore no credits are achieved.</p>	<table border="0"> <tr><td></td><td>1</td><td style="border: 1px solid black; text-align: center;">0</td></tr> <tr><td></td><td>2</td><td style="text-align: right;">(max 2)</td></tr> </table>		1	0		2	(max 2)																																							
	1	0																																													
	2	(max 2)																																													

<b>Ene3</b>	<b>Internal Lighting</b> Credits are awarded based on the percentage of dedicated energy efficient lighting provided in habitable spaces within the dwelling. <ul style="list-style-type: none"> <li>Greater than or equal to 40%</li> <li>Greater than or equal to 75%</li> </ul> <b>Assumptions made:</b> At least 75% of fixed internal light fittings will be dedicated energy efficient fittings.	1 2	<div style="border: 1px solid black; width: 20px; height: 20px; text-align: center; margin: 0 auto;">2</div> (max 2)
<b>Ene4</b>	<b>Drying space</b> One credit is awarded for the provision of either internal or external drying space with posts and footings, or fixings capable of holding 4m+ of drying line for 1-2 bed dwellings and 6m+ for dwellings with 3 bedrooms or greater.  <b>Assumptions made:</b> Internal drying provisions will be provided for each unit.	1	<div style="border: 1px solid black; width: 20px; height: 20px; text-align: center; margin: 0 auto;">1</div> (max 1)
<b>Ene5</b>	<b>Energy Labelled White Goods</b> Credits are awarded where each dwelling is provided with either information about the EU Energy Labelling Scheme or White Goods with the ratings stated below: <ul style="list-style-type: none"> <li>EU Energy Labelling information</li> </ul> OR <ul style="list-style-type: none"> <li>A+ rated fridges and freezers and/or A rated washing machines &amp; dishwashers</li> </ul> AND <ul style="list-style-type: none"> <li>B rated washer dryers and tumble dryers</li> </ul> <b>Assumptions made:</b> White goods (with appropriate ratings) and energy labelling information will be provided for all units.	1  1  1	<div style="border: 1px solid black; width: 20px; height: 20px; text-align: center; margin: 0 auto;">2</div> (max 2)
<b>Ene6</b>	<b>External Lighting</b> Credits are awarded based on the provision of space lighting with dedicated energy efficient fittings and security lighting with appropriate control gear. <ul style="list-style-type: none"> <li>Space Lighting – Code compliant</li> <li>Security Lighting – Code compliant</li> </ul> <b>Assumptions made:</b> All external lighting will comply with the ILE Guidance Notes for the reduction of obtrusive light. Lighting will be low energy, and be controlled by daylight/PIR sensors (as appropriate) and master switches.	1  1	<div style="border: 1px solid black; width: 20px; height: 20px; text-align: center; margin: 0 auto;">2</div> (max 2)
<b>Ene7</b>	<b>Low or Zero Carbon Technologies</b> Credits are awarded where there is either a 10% or 15% reduction in the dwelling's total CO <sub>2</sub> emissions (SAP 2005) due to low or zero carbon technologies. Note that where funding has not been granted through the Low Carbon Buildings Programme, a feasibility study is required that meets the Code requirements. <ul style="list-style-type: none"> <li>10% reduction in CO<sub>2</sub> emissions or greater</li> <li>15% reduction in CO<sub>2</sub> emissions or greater</li> </ul>	1  1	<div style="border: 1px solid black; width: 20px; height: 20px; text-align: center; margin: 0 auto;">1</div> (max 2)

	<p><b>Assumptions made:</b> Low or zero carbon technologies will be specified to achieve a reduction in the CO<sub>2</sub> emissions for all dwellings of at least 10%.</p>		
Ene8	<p><b>Cycle Storage</b></p> <p>Credits are awarded where safe, secure and weather proof cycle storage is provided according to the Code requirements.</p> <ul style="list-style-type: none"> <li>Limited cycle storage</li> <li>Full cycle storage</li> </ul> <p><b>Assumptions made:</b> Secure, covered cycle storage will be provided at a ratio of 1 space per bed space, and will therefore exceed the Code requirements for full provision of 1 space per 1 bed unit, 2 spaces per 2 and 3 bed units, and 4 spaces per 4 bed units. The bike store for the flats will be located in the basement car park, whilst for the houses storage will be provided in the garages.</p>	1 1	<div style="border: 1px solid black; width: 20px; height: 20px; text-align: center; margin: 0 auto;">2</div> (max 2)
Ene9	<p><b>Home Office</b></p> <p>One credit is awarded for the provision of space for a home office. The location, space and services provided must meet the Code requirements.</p> <p><b>Assumptions made:</b> Sufficient area will be provided for a desk (1.8m) and a filing cabinet or bookshelf, in addition to a window, two double sockets and two telephone points, and the area having adequate ventilation.</p>	1	<div style="border: 1px solid black; width: 20px; height: 20px; text-align: center; margin: 0 auto;">1</div> (max 1)
Total Number of Energy Credits Achieved			<div style="border: 1px solid black; width: 20px; height: 20px; text-align: center; margin: 0 auto;">16</div> (max 29)
Water			
Wat1	<p><b>Internal Potable Water Use</b></p> <p>Credits are awarded based on the predicted average household water consumption, calculated using the Code Water Calculator Tool. Minimum standards for each code level apply.</p> <ul style="list-style-type: none"> <li>Less than 120 litres/person/day</li> <li>Less than 110 litres/person/day</li> <li>Less than 105 litres/person/day</li> <li>Less than 90 litres/person/day</li> <li>Less than 80 litres/person/day</li> </ul> <p><b>Assumptions made:</b> The sanitary specification will result in a water consumption rate of less than 105 litres/person/day. The following specification would provide one way of achieving this level: 4/2 litre toilet; washbasin taps at 3 l/min; kitchen tap at 3l/min; shower at 9l/min; bath (small) 150l; best practice washing machine (45l per cycle) and best practice dishwasher (11l per cycle) must be included – the total consumption equates to 103.6 litres according to the Code Water Calculator Tool.</p>	1 2 3 4 5	<div style="border: 1px solid black; width: 20px; height: 20px; text-align: center; margin: 0 auto;">3</div> (max 5)
Wat2	<p><b>External Potable Water Use</b></p> <p>One credit is awarded where a compliant system is specified for collecting rainwater for external irrigation purposes. Where no outdoor space is provided the credit can be achieved by default.</p> <p><b>Assumptions made:</b> Houses with private gardens will be provided with rainwater butts. Communal gardens will be provided with also be provided with compliant rainwater butts.</p>	1	<div style="border: 1px solid black; width: 20px; height: 20px; text-align: center; margin: 0 auto;">1</div> (max 1)

Total Number of Water Credits Achieved		<div style="border: 1px solid black; display: inline-block; padding: 2px 10px;">4</div> (max 6)	
Materials			
<b>Mat1</b>	<b>Environmental Impact of Materials</b>  <u>Mandatory Requirement:</u> At least three of the five key building elements must achieve a Green Guide 2007 Rating of A+ to D.  <u>Tradable Credits:</u> Points are awarded on a scale based on the Green Guide Rating of the specifications. The Code Materials Calculator can be used to predict a potential score.  <b>Assumptions made:</b> The exact materials specification is yet to be determined, however an initial consideration of the probable Green Guide ratings suggests that: The walls will be A rated; the floors will be a combination of B and E rated; the party walls will be a combination of A and C rated; the internal walls will be B rated; the windows will be C or D rated; the roof will be a combination of A, B, C and E rated.  The mandatory requirements will therefore be met and in addition 4 credits are likely to be achieved. Further credits may be achievable following a review of the materials specification at the detailed design stage.	1-15	<div style="border: 1px solid black; display: inline-block; padding: 2px 10px;">4</div> (max 15)
<b>Mat2</b>	<b>Responsible Sourcing of Materials – Basic Building Elements</b>  Credits are awarded where materials used in the key building elements are responsibly sourced. The Code Materials Calculator can be used to predict a potential score.  <b>Assumptions made:</b> Materials will be responsibly sourced where possible: all timber will be FSC certified, and non-timber products will be from a proven responsible source if feasible – however the relative immaturity of the (non-timber) sourcing certification schemes means that it is hard to guarantee that these credits can be achieved and no credits have currently been assumed.	1-6	<div style="border: 1px solid black; display: inline-block; padding: 2px 10px;">0</div> (max 6)
<b>Mat3</b>	<b>Responsible Sourcing of Materials – Finishing Elements</b>  Credits are awarded where materials used in the finishing elements are responsibly sourced. The Code Materials Calculator can be used to predict a potential score.  <b>Assumptions made:</b> Materials will be responsibly sourced where possible: all timber will be FSC certified, and non-timber products will be from a proven responsible source if feasible – however the relative immaturity of the (non-timber) sourcing certification schemes means that it is hard to guarantee that these credits can be achieved and no credits have currently been assumed.	1-3	<div style="border: 1px solid black; display: inline-block; padding: 2px 10px;">0</div> (max 3)
Total Number of Materials Credits Achieved		<div style="border: 1px solid black; display: inline-block; padding: 2px 10px;">4</div> (max 24)	
Surface Water Run-off			
<b>Sur1</b>	<b>Reduction of Surface Water Run-off from Site</b>  <u>Mandatory Requirement:</u> Peak run-off rates and annual run-off volumes post development must not exceed the previous conditions for the site.  <u>Tradable Credits:</u> Where rainwater holding facilities/SUDs are used to provide attenuation of water run-off for the volumes required and in accordance with the Code criteria.  <b>Assumptions made:</b> The Proposed Development will not increase the surface water run-off, and	1-2	<div style="border: 1px solid black; display: inline-block; padding: 2px 10px;">2</div> (max 2)

	therefore the mandatory requirements will be met. In addition SUDS will provide attenuation, reducing the surface run-off from roofs and hard surfaces by over 50%.		
<b>Sur2</b>	<p><b>Flood Risk</b></p> <p>Credits are awarded where developments are located in areas of low flood risk, or where in areas of medium or high flood risk appropriate measures are taken to prevent damage to the property and its contents in accordance with the Code criteria.</p> <p><b>Assumptions made:</b> The Site has been identified as in an area with low annual probability of flooding, according to the flood risk assessment.</p>	1-2	<div style="border: 1px solid black; width: 30px; height: 30px; text-align: center; margin: 0 auto;">2</div> <p>(max 2)</p>
Total Number of Surface Water Run-off Credits Achieved			<div style="border: 1px solid black; width: 30px; height: 30px; text-align: center; margin: 0 auto;">4</div> <p>(max 4)</p>
Waste			
<b>Was1</b>	<p><b>Household Waste Storage</b></p> <p><u>Mandatory Requirement:</u> The space provided for waste storage should be sized to hold the larger of either all external containers provided by the Local Authority or the minimum capacity calculated from BS 5906.</p> <p><u>Tradable Credits</u> are awarded for adequate internal and/or external recycling facilities.</p> <p><b>Assumptions made:</b> The waste storage area would be of an adequate size to hold the necessary Local Authority storage containers. In addition, full provision for internal and external recycling bins will be made: 3 internal recycling bins with a minimum combined storage capacity of 30l will be provided (Cambridge City Council requires some pre-collection sorting); 3 external recycling bin with a combined storage capacity of 180l will be provided; Cambridge City Council operates a recycling collection scheme for households.</p>	4	<div style="border: 1px solid black; width: 30px; height: 30px; text-align: center; margin: 0 auto;">4</div> <p>(max 4)</p>
<b>Was2</b>	<p><b>Site Waste Management Plan (SWMP)/Construction Waste</b></p> <p><u>Mandatory Requirements:</u> A SWMP plan including the monitoring of waste generated on site and the setting of targets to promote resource efficiency must be produced and implemented.</p> <p><u>Tradable Credits:</u> The SWMP should also include procedures and commitments for minimising waste and/or commitments to sort, reused and recycle construction waste.</p> <p><b>Assumptions made:</b> A comprehensive SWMP will be produced and adhered to.</p>	1-2	<div style="border: 1px solid black; width: 30px; height: 30px; text-align: center; margin: 0 auto;">2</div> <p>(max 2)</p>
<b>Was3</b>	<p><b>Composting</b></p> <p>One credit is awarded where individual home composting facilities are provided, or where a community/communal composting service, either run by the Local Authority or overseen by a management plan is in operation.</p> <p><b>Assumptions made:</b> Cambridge City Council has a collection for kitchen and garden waste. Confirmation will be required that this service will be extended to the Proposed Development, however 1 credit is assumed at this stage.</p>	1	<div style="border: 1px solid black; width: 30px; height: 30px; text-align: center; margin: 0 auto;">1</div> <p>(max 1)</p>
Total Number of Waste Credits Achieved			<div style="border: 1px solid black; width: 30px; height: 30px; text-align: center; margin: 0 auto;">7</div> <p>(max 7)</p>
Pollution			
<b>Pol1</b>	<b>Global Warming Potential (GWP) of Insulants</b>		

	<p>One credit is awarded where all insulating materials have a Global Warming Potential (GWP) of less than 5.</p> <p><b>Assumptions made:</b> All insulation specified (associated with the building fabric and building services) will have a GWP of less than 5.</p>	1	<div style="border: 1px solid black; display: inline-block; padding: 2px 10px;">1</div> (max 1)
<b>Pol2</b>	<p><b>NO<sub>x</sub> Emissions</b></p> <p>Credits are awarded on the basis of NO<sub>x</sub> emissions arising from the operation of the space heating system within the dwelling.</p> <ul style="list-style-type: none"> <li>• Less than 100 mg/kWh</li> <li>• Less than 70 mg/kWh</li> <li>• Less than 40 mg/kWh</li> </ul> <p><b>Assumptions made:</b> Gas boilers with a NO<sub>x</sub> emissions rating of less than 40 mg/kWh will be specified (subject to viability).</p>	1 2 3	<div style="border: 1px solid black; display: inline-block; padding: 2px 10px;">3</div> (max 3)
Total Number of Pollution Credits Achieved			<div style="border: 1px solid black; display: inline-block; padding: 2px 10px;">4</div> (max 4)
<b>Health &amp; Wellbeing</b>			
<b>Hea1</b>	<p><b>Daylighting</b></p> <p>Credits are awarded for ensuring key rooms in the dwelling have high daylight factors (DF) and a view of the sky.</p> <ul style="list-style-type: none"> <li>• Where the kitchen has an average DF greater than 2 %</li> <li>• Where the living room, dining room and study have an average DF greater than 1.5 %</li> <li>• Where all above rooms have a view of the sky</li> </ul> <p><b>Assumptions made:</b> Compliant daylight levels may be achieved. Calculations/modelling are required to confirm, and therefore no credits have been assumed at this stage.</p>	1 2 3	<div style="border: 1px solid black; display: inline-block; padding: 2px 10px;">0</div> (max 3)
<b>Hea2</b>	<p><b>Sound Insulation</b></p> <p>Credits are awarded where performance standards exceed those required in Building Regulations Part E. This can be demonstrated by carrying out pre-completion testing or through the use of Robust Details.</p> <ul style="list-style-type: none"> <li>• Where airborne noise reduction is 3dB higher and impact noise is 3dB lower than Part E</li> <li>• Where airborne noise reduction is 5dB higher and impact noise is 5dB lower than Part E</li> <li>• Where airborne noise reduction is 8dB higher and impact noise is 8dB lower than Part E</li> </ul> <p><b>Assumptions made:</b> Improved performance standards may be achieved, and pre-completion testing carried out, however this has not been confirmed at this stage.</p>	1 3 4	<div style="border: 1px solid black; display: inline-block; padding: 2px 10px;">0</div> (max 4)
<b>Hea3</b>	<p><b>Private Space</b></p> <p>One credit is awarded for the provision of an outdoor space that is at least partially private. The space must allow easy access to all occupants.</p> <p><b>Assumptions made:</b> Amenity space will be provided: private space will be provided, in the form of private gardens for the houses; semi-private space will be provided for the flats. The provision will meet the required 1.5m<sup>2</sup> of private space per bedroom or 1 m<sup>2</sup> of semi-private space per bedroom.</p>	1	<div style="border: 1px solid black; display: inline-block; padding: 2px 10px;">1</div> (max 1)

<b>Hea4</b>	<p><b>Lifetime Homes</b></p> <p>Credits are awarded where the developer has implemented all of the principles of the Lifetime Homes scheme.</p> <p><b>Assumptions made:</b> All dwellings will meet lifetime home standards.</p>	4	<div style="border: 1px solid black; width: 30px; height: 30px; text-align: center; margin: 0 auto;">4</div> <p>(max 4)</p>
Total Number of Health & Wellbeing Credits Achieved			<div style="border: 1px solid black; width: 30px; height: 30px; text-align: center; margin: 0 auto;">5</div> <p>(max 12)</p>
<b>Management</b>			
<b>Man1</b>	<p><b>Home User Guide</b></p> <p>Credits are awarded where a simple guide is provided to each dwelling covering information relevant to the 'non-technical' home occupier, in accordance with the Code requirements. The guide must be available in alternative formats on request, and should cover the following topics:</p> <ul style="list-style-type: none"> <li>• Operational issues</li> <li>• Site and surroundings</li> </ul> <p><b>Assumptions made:</b> A comprehensive Home User Guide will be compiled and distributed to all residents.</p>	2 1	<div style="border: 1px solid black; width: 30px; height: 30px; text-align: center; margin: 0 auto;">3</div> <p>(max 3)</p>
<b>Man2</b>	<p><b>Considerate Constructors Scheme</b></p> <p>Credits are awarded where there is a commitment to comply with best practice site management principles using either the Considerate Constructors Scheme or an alternative locally/nationally recognised scheme.</p> <ul style="list-style-type: none"> <li>• Best Practice:- score between 24 and 31.5</li> <li>• Best Practice+:- score between 32 and 40</li> </ul> <p><b>Assumptions made:</b> The contractor will be required to register with the Considerate Constructors Scheme and achieve a score greater than 32.</p>	1 2	<div style="border: 1px solid black; width: 30px; height: 30px; text-align: center; margin: 0 auto;">2</div> <p>(max 2)</p>
<b>Man3</b>	<p><b>Construction Site Impacts</b></p> <p>Credits are awarded where procedures meeting the Code requirements are in place for the following:</p> <ul style="list-style-type: none"> <li>• Monitor, report and set targets for CO<sub>2</sub>/energy use from site activities</li> <li>• Monitor, report and set targets for CO<sub>2</sub>/energy use from site related transport</li> <li>• Monitor, report and set targets for water consumption from site activities</li> <li>• Adopt best practice policies in respect of air (dust) pollution from site activities</li> <li>• Adopt best practice policies in respect of water (ground and surface) pollution</li> <li>• At least 80 % of site timber is responsibly sourced</li> </ul> <p>One credit is achieved for meeting two of the six procedures above.</p> <p>Two credits are achieved for meeting four of the six procedures above.</p> <p><b>Assumptions made:</b> The contractor will be required to minimize construction site impacts, and implement best practice guidance to achieve full credits.</p>	1 2	<div style="border: 1px solid black; width: 30px; height: 30px; text-align: center; margin: 0 auto;">2</div> <p>(max 2)</p>
<b>Man4</b>	<p><b>Security</b></p> <p>Credits are awarded for complying with Section 2 – Physical Security from Secured by Design – New Homes. An Architectural Liaison Officer (ALO), or</p>	2	<div style="border: 1px solid black; width: 30px; height: 30px; text-align: center; margin: 0 auto;">2</div>

	<p>alternative, needs to be appointed early in the design process and their recommendations incorporated.</p> <p><b>Assumptions made:</b> The principles of the Secured by Design guidance have been incorporated into the design of the Proposed Development. There will be consultation with an ALO, and their recommendations will be heeded.</p>		(max 2)
Total Number of Management Credits Achieved		9	(max 9)
Ecology			
<b>Eco1</b>	<p><b>Ecological Value of Site</b></p> <p>One credit is awarded for developing land of inherently low value.</p> <p><b>Assumptions made:</b> A suitably qualified ecologist has assessed the site and determined the habitats present to be of "negligible value to wildlife". The Ecology Report (section 4.2) states that "the habitats, features and species are generally of low biodiversity value".</p>	1	1 (max 1)
<b>Eco2</b>	<p><b>Ecological Enhancement</b></p> <p>One credit is awarded where there is a commitment to enhance the ecological value of the development site.</p> <p><b>Assumptions made:</b> A suitably qualified ecologist has been appointed to advice on the ecological enhancement of the Site. There is a commitment to incorporate all the key recommendations and at least 30% of the additional recommendations.</p>	1	1 (max 1)
<b>Eco3</b>	<p><b>Protection of Ecological Features</b></p> <p>One credit is awarded where there is a commitment to maintain and adequately protect features of ecological value.</p> <p><b>Assumptions made:</b> All ecological features located outside the construction zone and along the site boundaries will be protected. Mitigation measures are set out in the Ecological Report (section 5).</p>	1	1 (max 1)
<b>Eco4</b>	<p><b>Change of Ecological Value of Site</b></p> <p>Credits are awarded where the change in ecological value has been calculated in accordance with the Code requirements and is calculated to be:</p> <ul style="list-style-type: none"> <li>• Minor negative change: between -9 and -3 species</li> <li>• Neutral: between -3 and +3 species</li> <li>• Minor enhancement: between +3 and +9 species</li> <li>• Major enhancement: greater than 9</li> </ul> <p><b>Assumptions made:</b> The change in ecological value is likely to be in the range of +3 to +9 species, with an increase in species diversity following the inclusion of the ecological recommendations. This has not been calculated in the Ecology Report.</p>	1 2 3 4	2 (max 4)
<b>Eco5</b>	<p><b>Building Footprint</b></p> <p>Credits are awarded where the ratio of combined floor area of all dwellings on the site to their footprint is:</p> <ul style="list-style-type: none"> <li>• Houses 2.5:1 OR Flats 3:1</li> <li>• Houses 3:1 OR Flats 4:1</li> </ul> <p><b>Assumptions made:</b> Based on the schedule of accommodation (dated January 2008) the ratios are</p>	1 2	2 (max 2)

	as follows: 3.7:1 for the houses and 4:1 for the flats. Further calculations at a later date in the design process will be required to confirm the credit allocation.		
Total Number of Ecology Credits Achieved	<div style="border: 1px solid black; display: inline-block; padding: 2px 10px;">7</div> (max 9)		
Total in all Sections	<div style="border: 1px solid black; display: inline-block; padding: 2px 10px;">60</div> (max 104)		

# 18 PRE-ASSESSMENT RESULTS

Code for Sustainable Homes  
Summary Score sheet

Site: Brunswick Scheme

					Score assessment				
			Score	Credits available	Sub-total	Credits available	% achieved	Weighting factor	Credits Score
<b>Energy</b>	<b>Ene 1</b>	% DER Improvement over TER	5	15	16	29	55.2	0.364	20.08
	<b>Ene 2</b>	Building Fabric	0	2					
	<b>Ene 3</b>	Internal Lighting	2	2					
	<b>Ene 4</b>	Drying Space	1	1					
	<b>Ene 5</b>	Energy Labelled White Goods	2	2					
	<b>Ene 6</b>	External Lighting	2	2					
	<b>Ene 7</b>	Low or Zero Carbon Technologies	1	2					
	<b>Ene 8</b>	Cycle Storage	2	2					
	<b>Ene 9</b>	Home Office	1	1					
<b>Water</b>	<b>Wat 1</b>	Internal Potable Water Use	3	5	4	6	66.7	0.09	6.00
	<b>Wat 2</b>	External Potable Water Use	1	1					
<b>Materials</b>	<b>Mat 1</b>	Environmental Impact of Materials	4	15	4	24	16.7	0.072	1.20
	<b>Mat 2</b>	Responsible Sourcing of Materials - Basic Building Elements	0	6					
	<b>Mat 3</b>	Responsible Sourcing of Materials - Finishing Elements	0	3					
<b>Surface Water Run-Off</b>	<b>Sur 1</b>	Reduction of Surface Water Run-off from Site	2	2	4	4	100.0	0.022	2.20
	<b>Sur 2</b>	Flood Risk	2	2					
<b>Waste</b>	<b>Was 1</b>	Household Waste Storage	4	4	7	7	100.0	0.064	6.40
	<b>Was 2</b>	Site Waste Management Plan/Construction Waste	2	2					
	<b>Was 3</b>	Composting	1	1					
<b>Pollution</b>	<b>Pol 1</b>	GWP of Insulants	1	1	4	4	100.0	0.028	2.80
	<b>Pol 2</b>	NOx Emissions	3	3					
<b>Health and Wellbeing</b>	<b>Hea 1</b>	Daylighting	0	3	5	12	41.7	0.14	5.83
	<b>Hea 2</b>	Sound Insulation	0	4					
	<b>Hea 3</b>	Private Space	1	1					
	<b>Hea 4</b>	Lifetime Homes	4	4					
<b>Management</b>	<b>Man 1</b>	Home User Guide	3	3	9	9	100.0	0.1	10.00
	<b>Man 2</b>	Considerate Constructors Scheme	2	2					
	<b>Man 3</b>	Construction Site Impacts	2	2					
	<b>Man 4</b>	Security	2	2					
<b>Land Use and Ecology</b>	<b>Eco 1</b>	Ecological Value of Site	1	1	7	9	77.8	0.12	9.33
	<b>Eco 2</b>	Ecological Enhancement	1	1					
	<b>Eco 3</b>	Protection of Ecological Features	1	1					
	<b>Eco 4</b>	Change of Ecological Value of Site	2	4					
	<b>Eco 5</b>	Building Footprint	2	2					
					60	104			<b>Score: 63.85</b>
									<b>Code Level: Level 3</b>

# 19 CODE MANDATORY REQUIREMENTS

Before a dwelling can start to be awarded points under the Code it must achieve minimum standards in the following categories. Specific requirements are detailed under the main headings below for the targeted Code Level.

Level 4	105
Level 5	80
Level 6	80

## 19.1 Carbon Dioxide Emissions

Carbon dioxide (CO<sub>2</sub>) emissions resulting from operational energy consumption are calculated using SAP 2005). There are six levels of mandatory minimum standards – one for each Code Level.

**Table 2 Code Scale for CO<sub>2</sub>**

Rating	Minimum Percentage reduction in Dwelling Emission Rate Over Target Emission rate
Level 1	10 %
Level 2	18 %
Level 3	25 %
Level 4	44 %
Level 5	100 %
Level 6	'Zero carbon home'

Energy efficiency measures and solar water heating will be specified, resulting in a reduction in the DER over the TER of at least 25%, ensuring that the mandatory requirements for Code level 3 are met.

## 19.2 Potable Water Consumption

This is from WCs, showers and baths, taps and appliances, and is calculated using the Code Water Calculator. There are three levels of mandatory standards:

**Table 3 Code Scale for Water**

Rating	Minimum Potable water Consumption in litres per person per day
Level 1	120
Level 2	120
Level 3	105

The Level 3/4 target is onerous. The following specification has been identified as compliant, and is one way that the requirements could be met for the Proposed Development:

- Dual flush WCs (4/2 l flush);
- Wash hand basins with flow regulators set at 3.0 litres/minute;
- Kitchen sinks with flow regulators set at 3.0 litres/minute;
- Low flow showers with flow regulators set at a maximum of 9 litres/minute;
- Small bath with maximum capacity of 150 litres; and
- Best practice washing machine (45 litres/cycle) and a standard practice dishwasher (11 litres/cycle) are assumed.

## 19.3 Embodied Impacts of Construction Materials

At least three of the following five key elements must achieve a relevant Green Guide rating from the 2007 version of The Green Guide of A+ to D:

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

Before a dwelling can start to be awarded points under the Code it must achieve the minimum standards above. The materials specified for the Proposed Development would meet the mandatory requirements.

## 19.4 Surface Water Run Off

The developer must ensure that peak run-off rates and annual volumes of run-off post development will be no greater than the previous conditions for the site.

Before a dwelling can start to be awarded points under the Code it must achieve the minimum standards above. The Proposed Development would not increase the run-off from

the Site; further, SUDS will be specified to reduce run-off below the existing rates. EITHER

### 19.5 Construction Site Waste Management

As required under the Code, a Site Waste Management Plan must be produced and implemented. This will require the monitoring of waste generated on site and the setting of targets to promote resource efficiency in accordance with the relevant guidance. The plan must also include details of how the waste will be measured and monitored, the name and position of the person who is responsible for implementing the plan, and how the plan will be implemented.

Before a dwelling can start to be awarded points under the Code it must achieve the minimum standards above. A Site Waste Management Plan would be produced for the Site.

### 19.6 Household Waste Storage Space and Facilities

The space allowed for waste storage should be sized to hold the larger of the two (by volume) of the following:

- All external containers provided under the relevant Local Authority refuse collection/recycling schemes. Containers should not be stacked to ensure ease of access and use.

OR

- The minimum capacity of waste storage as calculated from BS 5906 (Code of Practice for Storage and On-Site Treatment of Solid waste from Buildings (2005)

All containers must be accessible to disabled people, particularly wheelchair users and sited on a hard, level surface.

Before a dwelling can start to be awarded points under the Code it must achieve the minimum standards above.

Comprehensive internal and external recycling bins would be provided, and the space allowed for waste storage sized accordingly.

# PRELIMINARY BREEAM MULTI-RESIDENTIAL REPORT

---

## Preliminary BREEAM Multi-Residential Report

Revision C

May 2008

<b>Date</b>	<b>Revision</b>	<b>Status</b>	<b>Comment</b>	<b>Q/A</b>
26.02.08	-	Preliminary	For Comment	307-140-01
24.04.08	A	Draft	For Comment	307-140-01
06.05.08	B	Draft	For Comment	307-140-01
13.05.08	C	Draft	For Comment	307-140-01
05.02.09	D	Draft	For Comment	307-140-01

# 20 INTRODUCTION

## 20.1 Proposed Development

The development comprises a residential led mixed-use scheme to include 195 apartments, 10 townhouses, 251 student rooms (to be provided in lieu of Affordable Housing) community café, new public square and associated works. The private residential units are dealt with separately in the Code for Sustainable Homes Report, undertaken by RYB Konsult. The development responds to the Cambridge City Council Local Plan 2006 in providing student accommodation in lieu of affordable housing on this site.

BREEAM Multi-residential 2006

BREEAM is a voluntary scheme that aims to quantify and reduce the environmental burdens of buildings by rewarding those designs that take positive steps to minimise their environmental impacts.

Projects are assessed using a system of credits. The credits are grouped within the following categories:

- Management
- Energy
- Transport
- Health and Well Being
- Water
- Materials and Waste
- Land use
- Site Ecological Value
- Pollution

The assessment process results in a report covering the issues assessed together with a formal certification giving a rating on a scale of PASS, GOOD, VERY GOOD, EXCELLENT and OUTSTANDING.

The BREEAM Multi-residential scheme is used to assess buildings with communal areas, such as student halls of residence and sheltered housing for the elderly.

## 20.2 Scoring System

Within each of the BREEAM categories outlined above, there are a number of credit requirements that reflect the options available to designers and managers of buildings.

An environmental weighting is applied to the scores achieved under each category, as shown below, in order to calculate the final BREEAM score. The weighting factors have been derived from consensus based research with various groups such as government, material suppliers and lobbyists. This research was carried out by BRE to establish the relative importance of each environmental issue.

**Table 2 BREEAM Scale**

Rating	Requirements
PASS (score of 25)	Most developments should be able to achieve this with design/specification changes at a minimal additional cost.
GOOD (score of 40)	The developer has been able to demonstrate good practice in most areas.
VERY GOOD (score of 55)	Developments pushing forward the boundaries of environmental performance will achieve this.
EXCELLENT (score of 70)	Developments demonstrating exemplary environmental performance across the full range of issues will achieve this.
OUTSTANDING * (score of ≥85)	Developments demonstrating exemplary environmental performance across the full range of issues will achieve this.

## 20.3 Innovation Credits

Innovation credits have been introduced under BREEAM 2008 to provide additional recognition for a building that innovates in the field of sustainable performance, above and beyond the level that is currently recognised and rewarded within standard BREEAM issues. Innovation credits therefore enable clients and design teams to boost their building's BREEAM performance and in addition, help support the market for new innovative technologies and practices.

An additional 1% score can be added to a building's final BREEAM score for each Innovation credit achieved. The maximum number of Innovation credits that can be awarded for any one building assessed is 10; therefore the maximum available score achieved for 'innovation' is 10%. Innovation credits can be awarded regardless of the final BREEAM rating i.e. they are awardable at any BREEAM rating level.

There are two different ways in which a building can achieve an Innovation credit. The first is by meeting exemplary performance requirements for an existing BREEAM issue. The relevant credits are as follows:

- **Man 2** - Considerate Constructors

- **Hea 1** - Daylighting
- **Hea 14** - Office Space (BREEAM Retail & Industrial Schemes only)
- **Ene 1** - Reduction of CO2 emissions
- **Ene 5** - Low or Zero Carbon Technologies
- **Wat 2** - Water Meter
- **Mat 1** - Materials Specification
- **Mat 5** - Responsible Sourcing of Materials
- **Wst 1** - Construction Site Waste Management

The second route is where an application is made to BRE Global by the BREEAM assessor to have a particular building feature, system or process recognised as 'innovative'. If the application is successful an Innovation credit can be awarded. The flow chart and eligibility criteria below outline the process to be used when applying for an Innovation credit. An additional fee is charged for each innovation credit application received.

#### 20.4 Mandatory Standards

Mandatory standards have also been introduced under the BREEAM 2008 scheme. Different requirements are set for according to the overall BREEAM rating. These are displayed in Table 2.

#### Minimum BREEAM standards

BREEAM issue		PASS	GOOD	VERY GOOD	EXCELLENT	OUTSTANDING
Man 1	Commissioning	1	1	1	1	2
Man 2	Considerate Constructors				1	2
Man 4	Building user guide				1	1
Hea 4	High frequency lighting	1	1	1	1	1
Hea 12	Microbial contamination	1	1	1	1	1
Ene 1	Reduction of CO2 emissions				6	10
Ene 2	Sub-metering of substantial energy uses			1	1	1
Ene 5	Low or zero carbon technologies				1	1
Wat 1	Water consumption		1	1	1	2
Wat 2	Water meter		1	1	1	1
Wst 3	Storage of waste recyclable				1	1
LE 4	Mitigating ecological impact			1	1	1

# 21 PRE-ASSESSMENT ESTIMATOR

Issue		Credits Available	Credits Awarded
Management			
<b>Man1</b>	<p><b>Commissioning</b></p> <p>Where evidence provided demonstrates that an appropriate project team member has been appointed to monitor commissioning on behalf of the client to ensure commissioning will be carried out in line with current Building Regulations, BSRIA/CIBSE guidelines and (where applicable), best practice and where there are complex systems then a specialist agent or manager is appointed.</p> <p>Evidence should also be provided to show that seasonal commissioning will be carried out during the first year of occupation of the building.</p> <p><b>Assumptions made:</b></p> <p>Both commissioning and seasonal commissioning will be undertaken.</p>	<p>1</p> <p>1</p>	<p style="border: 1px solid black; display: inline-block; padding: 2px;">2</p> <p>(max 2)</p>
<b>Man2</b>	<p><b>Considerate Constructors</b></p> <p>Where the project complies with either the Considerate Constructors scheme or an alternative independently assessed scheme and where a firm commitment is made to achieve certification under that scheme to the following standards:</p> <ul style="list-style-type: none"> <li>• Better than industry standard</li> </ul> <p>OR</p> <ul style="list-style-type: none"> <li>• Best practice</li> </ul> <p><b>Assumptions made:</b></p> <p>The contractor will adhere to the Considerate Constructors scheme and achieve a better than the industry standard.</p>	<p>1</p> <p>2</p>	<p style="border: 1px solid black; display: inline-block; padding: 2px;">1</p> <p>(max 2)</p>
<b>Man3</b>	<p><b>Construction Site Impacts</b></p> <p>Where evidence provided demonstrates that</p> <ul style="list-style-type: none"> <li>• 2 or more of items a-g, listed below are achieved.</li> </ul> <p>OR</p> <ul style="list-style-type: none"> <li>• 4 or more of items a-g, listed below are achieved.</li> </ul> <p>OR</p> <ul style="list-style-type: none"> <li>• 6 or more of items a-g, listed below are achieved.</li> </ul> <p>a) Monitor and report CO2 or energy arising from site activities.</p> <p>b) Monitor and report on water consumption from site activities.</p> <p>c) Monitor and report transport to and from site to enable CO2 emissions arising from transport to be calculated.</p> <p>d) Monitor construction waste on site.</p> <p>e) Sort and recycle construction waste on site.</p>	<p>1</p> <p>2</p> <p>3</p>	<p style="border: 1px solid black; display: inline-block; padding: 2px;">3</p>



Hea2	<p><b>View Out</b></p> <p>Where evidence provided demonstrates that all workstations / desks in office and IT areas have a view out and are within a 7m radius of a window AND all study bedrooms in student halls have a view out with the desk within a 7m radius of a window. The window/opening is <math>\geq 20\%</math> of the total inside wall</p> <p><b>Assumptions made:</b></p> <p>All desks are within 7m of a wall with a window or permanent opening providing an adequate view out.</p>	1	<div style="border: 1px solid black; padding: 2px; display: inline-block;">1</div> (max 1)
Hea3	<p><b>Glare Control</b></p> <p>Where evidence provided demonstrates that an occupant controlled glare control system (e.g. internal or external blinds) is fitted to all areas where computer workstations will be located, close work will be undertaken or visual aids will be used (such as projectors etc).</p> <p><b>Assumptions made:</b></p> <p>Occupant controlled blinds will be fitted for all windows serving workstations.</p>	1	<div style="border: 1px solid black; padding: 2px; display: inline-block;">1</div> (max 1)
Hea4	<p><b>High Frequency Lighting</b></p> <p>Where evidence provided demonstrates that high frequency ballasts are installed on all fluorescent and compact fluorescent lamps.</p> <p><b>Assumptions made:</b></p> <p>High frequency ballasts will be specified throughout.</p>	1	<div style="border: 1px solid black; padding: 2px; display: inline-block;">1</div> (max 1)
Hea5	<p><b>Internal and External Lighting Levels</b></p> <p>Where evidence provided demonstrates that all internal and external lighting, where relevant, is specified in accordance with the appropriate maintained illuminance levels (in lux) recommended by CIBSE.</p> <p><b>Assumptions made:</b></p> <p>All lighting will meet the required CIBSE illuminance levels.</p>	1	<div style="border: 1px solid black; padding: 2px; display: inline-block;">1</div> (max 1)
Hea7	<p><b>Potential for Natural Ventilation</b></p> <p>Where evidence provided demonstrates that external façade windows to all occupied areas are openable.</p> <p><b>Assumptions made:</b></p> <p>It is anticipated that natural ventilation will be available for the majority of rooms and that windows will be openable. However due to noise impacts some windows to the rear elevation of the proposed development may not be openable, therefore the credit is not awarded at this stage.</p>	1	<div style="border: 1px solid black; padding: 2px; display: inline-block;">1</div> (max 1)
Hea8	<p><b>Indoor Air Quality</b></p> <p>Where air intakes serving occupied areas avoid major sources of external pollution and recirculation of exhaust air.</p> <p><b>Assumptions made:</b></p> <p>There are 2 potential sources of pollution located adjacent to the site: the tyre depot to the south; and the dual carriageway, Elizabeth Way, to the East. The tyre depot is adjacent to the southern edge of the block, whilst Elizabeth Way is located approximately 15m from the closest student rooms situated on the ground floor. A number of measures to mitigate the potential of air pollution have been incorporated, such as mechanical ventilation for all bedrooms, and fenestration located away from the tyre depot, however no credit s can be awarded.</p>	1	<div style="border: 1px solid black; padding: 2px; display: inline-block;">0</div> (max 1)
Hea9	<p><b>Volatile Organic Compounds</b></p> <p>Where evidence provided demonstrates that the emissions of VOCs and other substances from key internal finishes and fittings comply with the best practice levels.</p> <p><b>Comments &amp; Assumptions:</b></p> <p>It is not yet known whether low VOC compounds will be specified for internal finishes and fittings. Credit not awarded.</p>	1	<div style="border: 1px solid black; padding: 2px; display: inline-block;">0</div> (max 1)

<b>Hea10</b>	<p><b>Thermal Comfort</b></p> <p>Where thermal comfort levels are assessed at design stage, this is used to evaluate appropriate servicing options, and appropriate thermal comfort levels are achieved.</p> <p><b>Comments &amp; Assumptions:</b> A thermal model shall be used to inform the service design in compliance with BREEAM requirements.</p>	1	<div style="border: 1px solid black; width: 20px; height: 20px; text-align: center; margin: 0 auto;">1</div> (max 1)
<b>Hea 11</b>	<p><b>Thermal Zoning</b></p> <p>Where evidence provided demonstrates that local control is available for temperature adjustment in both communal and residential areas to reflect differing load requirements.</p> <p><b>Assumptions made:</b> All bedrooms and kitchens within the flat will have occupant control. Communal areas will not have occupant control. The office area will have occupant control.</p>	1	<div style="border: 1px solid black; width: 20px; height: 20px; text-align: center; margin: 0 auto;">1</div> (max 1)
<b>Hea12</b>	<p><b>Microbial Contamination</b></p> <p>Where evidence provided demonstrates that the risk of waterborne and airborne legionella contamination has been minimised.</p> <p><b>Assumptions made:</b> No humidification will be present, therefore the credit is awarded by default.</p>	1	<div style="border: 1px solid black; width: 20px; height: 20px; text-align: center; margin: 0 auto;">1</div> (max 1)
<b>Hea 15</b>	<p><b>Outdoor Space</b></p> <p>Where evidence provided demonstrates the provision of an adequate outdoor amenity space (2m<sup>2</sup>/dwelling) accessible for use by the building's occupants.</p> <p><b>Comments &amp; Assumptions:</b> The site has a central courtyard area of sufficient private space.</p>	1	<div style="border: 1px solid black; width: 20px; height: 20px; text-align: center; margin: 0 auto;">1</div> (max 1)
<b>Hea 20</b>	<p><b>Home Office</b></p> <p>For the provision of a space and services which allows the occupants to set up a home office in a quiet room.</p> <p><b>Comments &amp; Assumptions:</b> Student rooms will be provided with a suitable study area.</p>	1	<div style="border: 1px solid black; width: 20px; height: 20px; text-align: center; margin: 0 auto;">1</div> (max 1)
<b>Hea 21</b>	<p><b>Sound Insulation</b></p> <p>Where evidence provided demonstrates that:</p> <ul style="list-style-type: none"> <li>· Airborne sound insulation values are at least 3dB higher</li> <li>· Impact sound insulation values are at least 3dB lower</li> </ul> <p><b>OR</b></p> <ul style="list-style-type: none"> <li>· Airborne sound insulation values are at least 5dB higher</li> <li>· Impact sound insulation values are at least 5dB lower</li> </ul> <p><b>OR</b></p> <ul style="list-style-type: none"> <li>· Airborne sound insulation values are at least 8dB higher</li> <li>· Impact sound insulation values are at least 8dB lower</li> </ul> <p>Than the performance standards set out in the Building regulations for England and Wales, Approved Document E (2003 edition, with amendments 2004)</p> <p><b>Comments &amp; Assumptions:</b> An improvement of at least 3dB over Part E of the building regulations will be achieved.</p>	1  3  4	<div style="border: 1px solid black; width: 20px; height: 20px; text-align: center; margin: 0 auto;">1</div> (max 4)
Total Number of Health & Wellbeing Credits Achieved			<div style="border: 1px solid black; width: 20px; height: 20px; text-align: center; margin: 0 auto;">11</div> (max 17)
<b>Ene1</b>	<p><b>Reduction of CO<sub>2</sub> Emissions</b></p> <p>Where evidence provided demonstrates an improvement in the energy efficiency of the</p>		

	<p>building's fabric and services and therefore achieves lower building operational related CO2 emissions.</p> <table border="0"> <thead> <tr> <th>New Build</th> <th>Refurbishment</th> </tr> </thead> <tbody> <tr><td>• 63</td><td>100</td></tr> <tr><td>• 53</td><td>87</td></tr> <tr><td>• 47</td><td>74</td></tr> <tr><td>• 45</td><td>61</td></tr> <tr><td>• 43</td><td>50</td></tr> <tr><td>• 40</td><td>47</td></tr> <tr><td>• 37</td><td>44</td></tr> <tr><td>• 31</td><td>41</td></tr> <tr><td>• 28</td><td>36</td></tr> <tr><td>• 25</td><td>31</td></tr> <tr><td>• 23</td><td>28</td></tr> <tr><td>• 20</td><td>25</td></tr> <tr><td>• 18</td><td>22</td></tr> <tr><td>• 10</td><td>28</td></tr> <tr><td>• 0</td><td>15</td></tr> <tr><td>• &lt;0</td><td>≤0</td></tr> <tr><td>• True zero carbon building</td><td></td></tr> </tbody> </table> <p>Comments &amp; Assumptions: The site will feature energy saving measures and low and zero carbon technologies such as solar collectors. The energy strategy indicates that the EPC rating will be 37 hence 6 credits are achievable.</p>	New Build	Refurbishment	• 63	100	• 53	87	• 47	74	• 45	61	• 43	50	• 40	47	• 37	44	• 31	41	• 28	36	• 25	31	• 23	28	• 20	25	• 18	22	• 10	28	• 0	15	• <0	≤0	• True zero carbon building		<p>1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 Exemplar 1 Exemplar 2</p>	<p style="text-align: center; border: 1px solid black; width: 30px; margin: 0 auto;">6</p> <p>(max 15)</p>
New Build	Refurbishment																																						
• 63	100																																						
• 53	87																																						
• 47	74																																						
• 45	61																																						
• 43	50																																						
• 40	47																																						
• 37	44																																						
• 31	41																																						
• 28	36																																						
• 25	31																																						
• 23	28																																						
• 20	25																																						
• 18	22																																						
• 10	28																																						
• 0	15																																						
• <0	≤0																																						
• True zero carbon building																																							
<b>Ene2</b>	<p><b>Sub-metering of Substantial Energy Uses</b></p> <p>Where separate energy sub-meters are provided for the following systems (where present):</p> <ol style="list-style-type: none"> <li>a. Space Heating</li> <li>b. Humidification Plant</li> <li>c. Cooling Plant</li> <li>d. Fans (major)</li> <li>e. Lighting</li> <li>f. Small Power (lighting and small power can be on the same sub-meter where supplies are taken at each floor).</li> <li>g. Other major energy consuming items where appropriate</li> </ol> <p><b>Assumptions made:</b> Each flat cluster, and all substantial energy uses will be submetered.</p>	<p>1</p>	<p style="text-align: center; border: 1px solid black; width: 30px; margin: 0 auto;">1</p> <p>(max 1)</p>																																				
<b>E5</b>	<p><b>External Lighting</b></p> <p>Where energy efficient external luminaires are specified and all light fittings controlled for the presence of daylight.</p> <p><b>Assumptions made:</b> All lighting will be energy efficient and be fitted with a time switch or daylight sensor to allow for control.</p>	<p>1</p>	<p style="text-align: center; border: 1px solid black; width: 30px; margin: 0 auto;">1</p> <p>(max 1)</p>																																				
<b>Ene5</b>	<p><b>Low or Zero Carbon Technologies</b></p> <p>Where evidence provided demonstrates that a feasibility study considering local (on-site and/or near site) low or zero carbon (LZC) technologies has been carried out and the result implemented.</p> <p>Where evidence provided demonstrates that the first credit has been achieved and there is a 10% reduction in the building's CO2 emissions as a result of the installation of a feasible local LZC technology.</p> <p>Where evidence provided demonstrates that the first credit has been achieved and there is a 15% reduction in the building's CO2 emissions as a result of the installation of a feasible</p>	<p>1 2 3</p>	<p style="text-align: center; border: 1px solid black; width: 30px; margin: 0 auto;">2</p> <p>(max 3)</p>																																				

	local LZC technology. <b>Comments &amp; Assumptions:</b> An energy strategy has been provided and indicates that a saving of at least 10% will be achieved via solar collectors.		
<b>Ene 15</b>	<b>Energy Labelled White Goods</b> Credits are awarded where each dwelling is provided with either information about the EU Energy Labelling Scheme or White Goods with the ratings stated below: <ul style="list-style-type: none"> <li>EU Energy Labelling information</li> </ul> OR <ul style="list-style-type: none"> <li>A+ rated fridges and freezers and/or A rated washing machines &amp; dishwashers</li> </ul> AND <ul style="list-style-type: none"> <li>B rated washer dryers and tumble dryers</li> </ul> <b>Assumptions made:</b> White goods (with appropriate ratings) and / or energy labeling information will be provided for all student clusters.	1  1  1	1    (max 2)
<b>Ene 18</b>	<b>Drying Space</b> Where evidence provided demonstrates that space and posts/footings/fixings for drying clothes will be provided in a secure environment for each dwelling in the building. This may be external or internal. <b>Assumptions made:</b> No internal or external drying space will be provided.	1	0  (max 1)
Total Number of Energy Credits Achieved			11  (max 23)
<b>Transport</b>			
<b>Tra1</b>	<b>Provision of Public Transport</b> The credits are awarded on a sliding scale based on the assessed buildings' accessibility to the public transport network. <ul style="list-style-type: none"> <li>≥2</li> <li>≥4</li> <li>≥8</li> </ul> <b>Assumption made:</b> The site has an accessibility index (AI) of ≥2. TBC by David Ellis transport consultant.	1  2  3	1    (max 3)
<b>Tra2</b>	<b>Proximity to Amenities</b> Where the building is within 500m of the following amenities: a. Grocery shop and/or food outlet; b. Post box c. Cash machine  Where evidence provided demonstrates that the building is located within 1000m of at least 5 additional <i>accessible local amenities</i> appropriate to the building type and its users. <b>Assumptions made:</b> There is a post office located on Napier Street, approximately 200m to the South of the Site. The Site is within 400m of the Grafton Centre. The centre accommodates a number of services including a grocery shop, cash points and a building society; and a pharmacy. The Cambridge Chinese Community Centre is located just to the East of the Grafton Centre, within 1000m of the Site. The Kelsey Kerridge Leisure Centre is located on Queen Anne Terrace, approximately 900m to the South of the Site. Midsummer common is located adjacent to the Site, providing a large area of outdoor open space. There are a number of churches in the vicinity, including the Eden Baptist Church, and St Matthew C of E Church within 500m of the Site. There are a number of public houses located within	1  1	2  (max 2)

	500m of the Site, on Newmarket Road, and in the Grafton Centre.		
<b>Tra3</b>	<p><b>Cyclist Facilities</b></p> <p>Where evidence provided demonstrates that covered, secure and well-lit cycle storage facilities are provided for 10% building staff and 50% building residents.</p> <p><b>Comments &amp; Assumptions:</b> Cycle spaces will be provided at a rate of 2 per 3 bedrooms and for 1 visitor per 5 bedrooms. This will therefore exceed the BREEAM requirements of cycle racks for 50% of residents and 10% of building staff.</p>	1	<div style="border: 1px solid black; display: inline-block; padding: 2px;">1</div> (max 1)
<b>Tra4</b>	<p><b>Pedestrian and cyclist safety</b></p> <p>Where evidence provided demonstrates that;</p> <p>a. safe pedestrian routes to the local amenities are provided</p> <p>b. the site layout has been designed to minimise risks to pedestrians and cyclists.</p> <p><b>Assumptions made:</b></p> <p>Safe pedestrian routes will be provided, and the layout of the Site has been designed to ensure a pedestrian and cyclist friendly environment, based on the Home Zone principles. However these principles mean that the BREEAM criteria are not met, and no credits can be awarded.</p>	1	<div style="border: 1px solid black; display: inline-block; padding: 2px;">0</div> (max 1)
<b>Tra6</b>	<p><b>Maximum Car Parking Capacity</b></p> <p>Where evidence provided demonstrates that the number of parking spaces provided for the building has been limited</p> <p>No more than one parking space is provided for every three building users</p> <p>No more than one parking space is provided for every four building users</p> <p><b>Comments &amp; Assumptions:</b> No more than one parking space is provided for every four building users</p>	1 1	<div style="border: 1px solid black; display: inline-block; padding: 2px;">2</div> (max 2)
Total Number of Transport Credits Achieved			<div style="border: 1px solid black; display: inline-block; padding: 2px;">6</div> (max 9)
Water			
<b>Wat1</b>	<p><b>Water Consumption</b></p> <p>Where evidence provided demonstrates that the specification includes taps, urinals, WCs and showers that consume less potable water in use than standard specifications for the same type of fittings.</p> <p>Where evidence provided demonstrates the specification of systems that collect, store and, where necessary treat, rainwater or greywater for WC and urinal flushing purposes.</p> <p><b>Comments &amp; Assumptions:</b> WCs have an effective flush volume of 4.5 litres or less (e.g. 6/4 dual flush); all kitchen taps have flow rate less than 6l/min at 0.3MPa.</p>	1-4 1	<div style="border: 1px solid black; display: inline-block; padding: 2px;">2</div> (max 5)
<b>Wat2</b>	<p><b>Water Meter</b></p> <p>Where evidence is provided to demonstrate that a water meter with a pulsed output will be installed on the mains supply to each building.</p> <p><b>Assumptions made:</b> A water meter with a pulsed output will be specified.</p>	1	<div style="border: 1px solid black; display: inline-block; padding: 2px;">1</div> (max 1)
<b>Wat3</b>	<p><b>Major Leak Detection</b></p> <p>Where evidence is provided to demonstrate that a leak detection system is specified or installed.</p> <p><b>Assumptions made:</b> A leak detection system will be specified. The system will be capable of identifying major</p>	1	<div style="border: 1px solid black; display: inline-block; padding: 2px;">1</div> (max 1)

	leaks between the building and the site boundary and should cover all mains water supplies to the building. The system will be: audible when activated; activated when a continuous flow of water passes through the water meter at a flow rate above a pre-set minimum for a pre-set period of time; able to identify different leakage rates, e.g. continuous, high and/or low level leaks, over set time periods; programmable to suit the owner/occupiers' requirements.		
<b>Wat6</b>	<p><b>Irrigation systems</b></p> <p>Where evidence provided demonstrates that low-water irrigation systems are specified/installed, or where planting and landscaping is irrigated via rainwater or reclaimed water.</p> <p><b>Assumptions made:</b></p> <p>The planting will be designed to include species that require low levels of irrigation. There will be no mains supplied irrigation method, and water will be provided either by precipitation or manual watering.</p>	1	<div style="border: 1px solid black; display: inline-block; padding: 2px;">1</div> (max 1)
Total Number of Water Credits Achieved			<div style="border: 1px solid black; display: inline-block; padding: 2px;">5</div> (max 8)
<b>Materials</b>			
<b>Mat1</b>	<p><b>Materials Specification – Major Building Elements</b></p> <p>Up to four credits are available where evidence provided demonstrates that the major building elements (upper floors, external walls, windows and roof) specified have an 'A' rating, as defined in the Green Guide to Specification.</p> <p><b>Assumptions made:</b></p> <p>Assumes external and internal walls are A rated, roof is B rated, and windows, upper floors and floor finishes are C rated.</p>	1-6	<div style="border: 1px solid black; display: inline-block; padding: 2px;">2</div> (max 6)
<b>Mat2</b>	<p><b>Hard landscaping and boundary protection</b></p> <p>Where at least 80% of the combined area of external hard landscaping and boundary protection specifications achieve an A rating, as defined by the Green Guide to Specification.</p> <p><b>Assumptions made:</b></p> <p>The courtyard will be comprised of pre-cast concrete block pavers, which achieve an A rating according to the Green Guide to Specification. The site boundary will be predominantly marked by buildings.</p>	1	<div style="border: 1px solid black; display: inline-block; padding: 2px;">1</div> (max 1)
<b>Mat3</b>	<p><b>Reuse of Building Façade</b></p> <p>Where at least 50% of the new building's total façade comprises re-used façade and at least 80% by mass of the reused façade comprises in-situ re-used material</p> <p><b>Assumptions made:</b></p> <p>The Proposed Development is a new build project.</p>	1	<div style="border: 1px solid black; display: inline-block; padding: 2px;">0</div> (max 1)
<b>Mat4</b>	<p><b>Reuse of Building Structure</b></p> <p>Where evidence provided demonstrates that a design reuses at least 80% of an existing primary structure and for part refurbishment and part new build, the volume of the reused structure comprises at least 50% of the final structure's volume.</p> <p><b>Assumptions made:</b></p> <p>The Proposed Development is a new build project.</p>	1	<div style="border: 1px solid black; display: inline-block; padding: 2px;">0</div> (max 1)
<b>Mat5</b>	<p><b>Responsible Sourcing of Materials</b></p> <p>Where materials used in structural and non-structural elements are responsibly sourced.</p> <p><b>Assumptions made:</b></p> <p>Responsible sourcing certification schemes are under-developed for most materials, the</p>	1-3	<div style="border: 1px solid black; display: inline-block; padding: 2px;">0</div> (max 3)

	exception being for timber where schemes like the Forest Stewardship Council (FSC) Certification Scheme are rigorous and well-established. Full credits (e.g. 3 credits) cannot be achieved for responsible sourcing unless timber is specified for the majority of building elements. No credits are assumed at this stage of the design programme.		
<b>Mat6</b>	<p><b>Insulation</b></p> <p>Where evidence provided demonstrates that thermal insulation products used in the building have a low embodied impact relative to their thermal properties, determined by the <i>Green Guide to Specification</i> Rating.</p> <p>Where evidence provided demonstrates that thermal insulation products used in the building have been responsibly sourced.</p> <p><b>Comments &amp; Assumptions:</b> Mineral wool to be used for walls. Other insulation types to be confirmed by Architect.</p>	1  1	<div style="border: 1px solid black; width: 30px; height: 30px; display: flex; align-items: center; justify-content: center;">1</div> (max 2)
<b>Mat7</b>	<p><b>Designing for robustness</b></p> <p>Where protection is given to vulnerable parts of the building such as areas exposed to high pedestrian traffic, vehicular and trolley movements.</p> <p><b>Assumptions made:</b> Not all the requirements for robustness will be met; communal areas and flat corridors are likely to be carpeted.</p>	1	<div style="border: 1px solid black; width: 30px; height: 30px; display: flex; align-items: center; justify-content: center;">0</div> (max 1)
<b>Mat8</b>	<p><b>Responsible Sourcing of Materials; Finishing elements</b></p> <p>Up to 2 credits are available where evidence provided demonstrates that 80% of the assessed materials are responsibly sourced, including stairs, windows, doors, skirting, paneling, furniture, facias. Additionally 100% of any timber must be legally sourced.</p> <p><b>Comments &amp; Assumptions:</b> Finishing elements will be responsibly sourced where possible, however it is too early in the design stage to confirm that credits can be achieved.</p>	2	<div style="border: 1px solid black; width: 30px; height: 30px; display: flex; align-items: center; justify-content: center;">0</div> (max 2)
Total Number of Materials Credits Achieved			<div style="border: 1px solid black; width: 30px; height: 30px; display: flex; align-items: center; justify-content: center;">4</div> (max 17)
<b>Waste</b>			
<b>Construction Site Waste Management</b>			
<p>Up to three credits are available where evidence provided demonstrates that the amount of non-hazardous construction waste (m3/100m2 or tonnes 100m2) generated on site by the development is the same as or better than good or best practice levels.</p> <p>Where evidence provided demonstrates that a significant majority of non-hazardous construction waste generated by the development will be diverted from landfill and reused or recycled.</p> <p><b>Comments &amp; Assumptions:</b> A Site Waste Management Plan will be produced for the site. Off-site manufacture of modules indicates that the relevant KPIs are met / exceeded.</p>		3  1	<div style="border: 1px solid black; width: 30px; height: 30px; display: flex; align-items: center; justify-content: center;">2</div> (max 3)
<b>Recycled aggregates</b>			
<p>Where evidence provided demonstrates the significant use of recycled or secondary aggregates in 'high-grade' building aggregate uses.</p> <p><b>Assumptions made:</b> Recycled aggregate will be used where practical but content not yet known.</p>		1	<div style="border: 1px solid black; width: 30px; height: 30px; display: flex; align-items: center; justify-content: center;">0</div> (max 1)
<b>Recyclable waste storage</b>			
<p>Where storage space is provided for recyclable household waste in each:</p> <ul style="list-style-type: none"> <li>· Self contained dwelling</li> <li>· Communal kitchen or other suitable communal room</li> </ul> <p>Where a central, dedicated space is provided for the storage of the building's recyclable waste streams.</p> <p><b>Comments &amp; Assumptions:</b></p>		1  1	<div style="border: 1px solid black; width: 30px; height: 30px; display: flex; align-items: center; justify-content: center;">2</div> (max 2)

Recycled storage will be provided in communal kitchens and a clearly labelled, adequately sized, accessible site, ideally within 20m of a building entrance, will be provided to cater for the separation and storage of at least 6 types of recyclable materials.			
<b>Composting</b> Where individual home composting facilities are provided for individual dwellings/communal kitchens, <b>AND</b> Where evidence provided demonstrates there is a vessel on site for composting food waste, and adequate storage for such waste generated by the building's users and operation. <b>OR</b> Where space or access is limited, there is a dedicated space for compostable food waste to be stored prior to removal and composting at an alternative site. <b>Comments &amp; Assumptions:</b> Composting facilities are not expected to be provided for the student accommodation.		1	<input type="text" value="0"/> (max 1)
Total Number of Waste Credits Achieved			<input type="text" value="4"/> (max 8)
<b>Land Use &amp; Ecology</b>			
<b>LE1</b>	<b>Reuse of Land</b> Where evidence is provided to demonstrate that the footprint of the proposed development largely falls within the boundary of land previously developed. <b>Assumptions made:</b> The Site has been previously developed, and the Proposed Development falls within this boundary.	1	<input type="text" value="1"/> (max 1)
<b>LE2</b>	<b>Contaminated Land</b> Where evidence is provided to demonstrate that the land used for the new development has, prior to development, been defined as contaminated and where adequate remedial steps have been taken to decontaminate the site prior to construction. <b>Assumptions made:</b> The land is not identified as contaminated.	1	<input type="text" value="0"/> (max 1)
<b>LE3</b>	<b>Ecological Value of Land and Protection of Ecological Features</b> Where evidence is provided to demonstrate that the construction zone is defined as land of low ecological value and all existing features of ecological value will be fully protected from damage during site preparation and construction works. <b>Assumptions made:</b> The land within the construction zone has been identified by a suitably qualified ecologist as having low ecological value. Further, any trees that are to be removed have been classified as having little ecological value. Further confirmation is needed from the full ecological report, however the credit is currently assumed.	1	<input type="text" value="1"/> (max 1)
<b>LE4</b>	<b>Mitigating Ecological Impacts</b> Credits are awarded based upon the degree of negative impact the new development has on the site's existing ecology. In a formal BREEAM assessment the ecological impact of the development is calculated based on the area of habitat and number of floral species displaced, using BREEAM's ecological value calculator. <b>Assumptions made:</b> There will be no negative impact on the ecological value of the site and the number of species. Further confirmation is needed from the full ecological report, however the credits are currently assumed.	1-2	<input type="text" value="2"/> (max 2)
<b>LE5</b>	<b>Enhancing Site Ecology</b> Where evidence is provided to demonstrate that the design team (or client) has i) appointed a professional to advise and report on enhancing and protecting the ecological value of the site; AND	1	

	<p>ii) implemented the professional's recommendations for general enhancement and protection for site ecology.</p> <p>OR</p> <p>Where, in addition to the above, evidence is provided to demonstrate a positive increase in the ecological value of the site of up to (but not including) 6 species.</p> <p>OR</p> <p>Where, in addition to the above, evidence is provided to demonstrate a positive increase in the ecological value of the site of 6 species or greater.</p> <p><b>Assumptions made:</b></p> <p>A suitably qualified ecologist has advised on measures to enhance the ecological value of the Site, and these general recommendations will be implemented. Further details of the proposed enhancements are required to achieve additional credits.</p>	<p>2</p> <p>3</p>	<p>(max 3)</p>
<p><b>LE6</b></p>	<p><b>Long Term Impact on Biodiversity</b></p> <p>Where evidence is provided to demonstrate that the client has committed to achieving the mandatory requirements listed below and:</p> <ul style="list-style-type: none"> <li>· At least two of the additional requirements.</li> </ul> <p>OR</p> <ul style="list-style-type: none"> <li>· At least four of the additional requirements.</li> </ul> <p>NOTE: These point scores are not cumulative, simply award the appropriate points score corresponding to the predicted level of achievement.</p> <p><b>Mandatory Requirements</b></p> <p>A suitably qualified ecologist must confirm in writing that:</p> <ul style="list-style-type: none"> <li>• All relevant UK and EU legislation relating to protection and enhancement of ecology has been, or will be, complied with during the design and construction process.</li> <li>• An appropriate management plan is produced covering at least the first 5 years after project completion. This should include details of the scope of the management plan.</li> <li>• Key responsibilities, and with whom these responsibilities lie, e.g. owner, landlord, occupier, FM, other.</li> </ul> <p><b>Additional Requirements</b></p> <ul style="list-style-type: none"> <li>• A 'Biodiversity Champion' has been nominated</li> <li>• The relevant site work-force has been trained on how to protect site ecology during the project.</li> <li>• Record and monitor actions taken to protect biodiversity throughout key stages of construction</li> <li>• The client requires that a new ecologically valuable habitat, appropriate to the local area, be created.</li> <li>• The client requires the contractor to programme site works to minimize disturbance to wildlife.</li> <li>• The client requires actions to be taken to protect/enhance biodiversity</li> <li>• A Biodiversity Champion must have sufficient authority and time on site to influence activities and ensure that they have minimal detrimental impact on biodiversity</li> <li>• Local biodiversity expertise should be sought at, or before, the design stage</li> <li>• Where a site is deemed to have no ecological value</li> </ul> <p><b>Assumptions made:</b></p> <p>Details of the proposed enhancements and management plan are required to achieve</p>	<p>1</p> <p>2</p>	<p style="border: 1px solid black; display: inline-block; padding: 2px;">0</p> <p>(max 2)</p>

	additional credits. It is possible that 2 credits could be achieved.		
Total Number of Land Use & Ecology Credits Achieved			5 (max 10)
<b>Pollution</b>			
<b>Pol1</b>	<b>Refrigerant GWP – Building Services</b> Where evidence provided demonstrates the use of refrigerants with a global warming potential (GWP) of less than 5 or where there are no refrigerants specified for use in building services. <b>Assumptions made:</b> No cooling will be provided, the credit is not applicable.	1	1 (max 1)
<b>Pol2</b>	<b>Preventing Refrigerant Leaks</b> Where evidence provided demonstrates that refrigerant leaks can be detected or where there are no refrigerants specified for use in the building or development. Where there are refrigerants, evidence should be provided to demonstrate that the provision of automatic refrigerant pump down is made to a heat exchanger (or dedicated storage tanks) with isolation valves. <b>Assumptions made:</b> No cooling will be provided, the credit is not applicable.	1  1	2 (max 2)
<b>Pol 4</b>	<b>NO<sub>x</sub> Emissions of Heating Source</b> Where evidence provided demonstrates that the maximum dry NO <sub>x</sub> emissions from delivered space heating energy are: <ul style="list-style-type: none"> <li>• ≤100 mg/kWh (at 0% excess O<sub>2</sub>).</li> <li>• ≤70 mg/kWh (at 0% excess O<sub>2</sub>).</li> <li>• ≤40 mg/kWh (at 0% excess O<sub>2</sub>).</li> </ul> <b>Assumptions made:</b> Electric heating are specified it is likely that no credits will be awarded.	1-3	0 (max 3)
<b>Pol5</b>	<b>Minimising Flood Risk</b> Where evidence provided demonstrates that the assessed development is located in a zone defined as having a low annual probability of flooding. OR Where evidence provided demonstrates that the assessed development is located in a zone defined as having a medium annual probability of flooding and the ground level of the building, car parking and access is above the design flood level for the site's location. Where evidence provided demonstrates that Sustainable Urban Drainage techniques are specified to minimise the risk of localised flooding, resulting from a loss of flood storage on site through development. <b>Assumptions made:</b> The Site has been identified as in an area with low annual probability of flooding, according to the flood risk assessment. The attenuation afforded by the SUDS will be greater than 50% of the peak flow rate of water run-off, therefore 3 credits are awarded.	2  1  1	3 (max 3)

<b>Pol6</b>	<b>Minimising Water Course Pollution</b> Where evidence provided demonstrates that on site treatment such as oil separators/interceptors or filtration have been specified for areas at risk from pollution, i.e. vehicle manoeuvring areas, car parks, waste disposal facilities, delivery facilities or plant areas. <b>Assumptions made:</b> Petrol interceptors will be located in the car parking and vehicle access areas.	1	<div style="border: 1px solid black; display: inline-block; padding: 2px;">1</div> (max 1)
<b>Pol7</b>	<b>Reduction of Night Time Light Pollution</b> Where evidence provided demonstrates that the external lighting design is in compliance with the guidance in the Institution of Lighting Engineers (ILE) Guidance notes for the reduction of obtrusive light, 2005. <b>Assumptions made:</b> Lighting will be compliant with the ILE guidance, and provision will be made to ensure the lighting can be adequately controlled.	1	<div style="border: 1px solid black; display: inline-block; padding: 2px;">1</div> (max 1)
Total Number of Pollution Credits Achieved			<div style="border: 1px solid black; display: inline-block; padding: 2px;">8</div> (max 11)

# 22 PRE-ASSESSMENT RESULTS

The credits for BREEAM Multi-residential are area weighted across the development (e.g. for the student rooms, general communal areas, laundry room, etc). The score is therefore calculated using the official BREEAM spreadsheet. This spreadsheet is presented below, and demonstrates that the current score is 56.6%, equivalent to a Very Good rating.

			Score Assessment						
			Score	available	Sub-total	available	achieved	Weighting Factor	Credit Score
<b>Management</b>	Man1	Commissioning	2	2	3	42	75.8	0.42	3.88
	Man2	Construction Contractors	1	2					
	Man3	Construction Site Impact	3	4					
	Man4	Building Users Guide	1	1					
	Man6	Construction	1	2					
	Man8	Security	1	1					
<b>Health and Wellbeing</b>	Hea1	Daylighting	1	1	11	17	64.7	0.15	3.24
	Hea2	View Out	1	1					
	Hea3	Glare Control	1	1					
	Hea4	High Frequency Lighting	1	1					
	Hea5	Internal and External Lighting Levels	1	1					
	Hea7	Potential For Natural Ventilation	1	1					
	Hea8	Indoor Air Quality	1	1					
	Hea9	Volatile Organic Compounds	1	1					
	Hea10	Thermal Comfort	1	1					
	Hea11	Thermal Zoning	1	1					
	Hea12	Microbial Contamination	1	1					
	Hea15	Outdoor Space	1	1					
	Hea20	Home Office	1	1					
	Hea21	Sound Insulation	1	4					
<b>Energy</b>	Ena1	Reduction of CO2 Emissions	5	15	42	23	52.2	0.15	3.31
	Ena2	Sub-metering of Substantial Energy Users	1	1					
	Ena4	External Lighting	1	1					
	Ena5	Low or Zero Carbon Technologies	2	3					
	Ena15	Provision of Energy Efficient White Goods	1	2					
	Ena18	Drying Space	1	1					
<b>Transport</b>	Tra1	Provision of Public Transport	1	3	6	3	66.7	0.08	3.33
	Tra2	Proximity to Amenities	2	2					
	Tra3	Cyclist Facilities	1	1					
	Tra4	Pedestrian and Cyclist Safety	1	1					
	Tra6	Maximum Car Parking Capacity	2	2					
	<b>Water</b>	Wat1	Water Consumption	2	5	5	8	62.5	0.06
Wat2		Water Meter	1	1					
Wat3		Major Leak Detection	1	1					
Wat6		Irrigation Systems	1	1					
<b>Materials</b>	Mat1	Materials Specification - Major Building Elements	2	4	4	17	23.5	0.125	2.34
	Mat2	Hard Landscaping and boundary protection	1	1					
	Mat3	Reuse of Building Façade	1	1					
	Mat4	Reuse of Building Structure	1	1					
	Mat5	Responsible Sourcing of Materials	1	3					
	Mat6	Insulation	1	2					
	Mat7	Designing for Resilience	1	1					
	Mat8	Responsible Sourcing of materials: Finishing elements	1	2					
<b>Waste</b>	Wrt1	Construction Site Waste Management	2	4	4	8	58.8	0.075	3.75
	Wrt2	Recycled aggregate	1	1					
	Wrt3	Recyclable waste storage	2	2					
	Wrt5	Composting	1	1					
	<b>Ecology</b>	LE1	Reuse of Land	1	1	5	18	58.8	0.1
LE2		Contaminated Land	1	1					
LE3		Ecological Value of Site and Protection of Ecological	1	1					
LE4		Mitigating Ecological Impacts	2	2					
LE5		Enhancing Site Ecology	1	3					
LE6		Long Term Impact on Biodiversity	1	2					
<b>Pollution</b>	Pol1	Refrigerant GWP - Building Services	1	1	8	11	72.7	0.1	7.27
	Pol2	Preventing Refrigerant leaks	2	2					
	Pol4	NOx Emissions from Heating Sources	1	3					
	Pol5	Flood Risk	3	3					
	Pol6	Minimizing Watercourse Pollution	1	1					
	Pol7	Reduction of Night Time light Pollution	1	1					
						64	115	Score:	56.6%

RYB:KONSULT

REPORT COMPILED BY RYB