

FINAL

Residential Evidence Base Report  
For Planning Policy CE1  
For Royal Borough of Kensington & Chelsea

28.10.2009

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# EcoHomes Analysis of RBKC LDF

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# Issue Status

## EcoHomes Analysis of RBKC LDF

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# 1. Executive Summary

## EcoHomes Analysis of RBKC LDF

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Pitman Tozer Architects and Eight Associates have been appointed to provide an evidence base for the Royal Borough of Kensington & Chelsea (RBKC) policy related to meeting environmental standards and carbon emission reductions for existing dwellings in the Borough.

Workshops were held at RBKC offices on Monday 5<sup>th</sup> October and 14<sup>th</sup> October with Policy Managers, Design and Conservation Officers, Building Control, Pitman Tozer Architects and Eight Associates.

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### Brief and Findings

1. To consider the viability and feasibility to which conversions and refurbishments defined as major developments can be retrofitted to meet the Council's required environmental standards, without impacting unacceptably on townscape.

*This is detailed in sections four and five and concludes that an EcoHomes Rating of 'Very Good' is achievable, along with a requirement to achieve at least 40% of the credits in each of the water, energy and materials sections.*

2. The Methodology employed is a desktop study of 4 case studies to demonstrate the measures required to achieve a 'Very Good' and reduce the carbon emissions from the development sufficiently to meet the requirement of achieving 40% of the credits in the energy section of the EcoHomes assessment.

*It is concluded that this is feasible and also that improvements to the building fabric result in the most extensive carbon emissions reductions for the case studies.*

3. Provide recommendations on whether the policy is suitable for the Borough.

*It is concluded that the policy is suitable.*

A full copy of the brief is included within Appendix 1 of this report.

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### Summary of the Key Recommendations

- EcoHomes VERY GOOD is a suitable target to promote best practice.
  - Best practice will further be ensured through requiring developments to achieve at least 40% of the credits in each of the following EcoHomes sections: energy, water and materials credits.
  - An EcoHomes preliminary assessment should be required at Planning Stage. In addition, schemes should provide a Design Stage certificate prior to work starting on site and a Post Construction Stage Assessment prior to occupancy.
  - Carbon savings requirements in this report are achievable on the sites with current building materials, practices and technologies.
  - The design and conservation implications of the current policy are predominantly low for the case studies in Conservation Areas and lower for those outside Conservation Areas. For Grade II listed buildings each scheme should be treated on a case by case basis.
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# 2. Introduction eight associates

## 2.1 Aim of the Report

### EcoHomes Analysis of RBKC LDF

#### Introduction

The Royal Borough of Kensington and Chelsea (RBKC) have provided indicative environmental targets for retrofitting existing buildings as part of the draft publication of the Core Strategy for the Local Development Framework (LDF) - section 36 Policy CE 1b. The RBKC Core Strategy document includes a target for an EcoHomes VERY GOOD to be achieved for all "extensions and conversions defined as major development". (Please see Appendix 2 for the relevant part of RBKC's Core Strategy).

RBKC has provided a brief dated 23rd September 2009 to "determine the viability and feasibility to which existing buildings can be retrofitted to meet the Council's policy". As recognised in the brief, it is important to consider the urban design implications of the proposed environmental targets given that the "The Royal Borough has an exceptional historic townscape, with over 4,000 listed buildings and over 70% of the Borough is afforded conservation area status."

Pitman Tozer Architects and Eight Associates have collaborated to provide the energy modelling and EcoHomes advice alongside an analysis of the urban design implications of environmental measures. This document includes models of four case studies to analyse the feasibility of achieving an EcoHomes 'Very Good' rating.

Please note that EcoHomes has been used instead of Code for Sustainable Homes because the latter is for new build only. It should also be noted that modelling has been done of single unit terraced houses, whereas RBKC policy may relate to developments of multiple dwellings. It may therefore be advisable to carry out analysis on the transferability of this modelling. Furthermore, the findings in this report specifically covers the policy relating to retrofitting domestic properties and does not apply to new builds, extensions, subterranean development or commercial properties.

#### Aim

This document aims to carry out the following:

- 1. Identification of environmental measures** for retrofitting existing buildings in RBKC, including for buildings within Conservation Areas or with Grade II Listed Buildings Status. The elements relating to carbon emission savings will also be quantified in terms of their cost effectiveness and impact on the townscape to inform decision-makers on the environmental and urban design implications of the policy objective.
- 2. Case study appraisal of achieving EcoHomes 'Very Good'** for four case studies, including a cost/carbon study of achieving relevant energy targets.
- 3. Recommendations on targets** set out in Core Strategy.

#### Consultants

Pitman Tozer Architects: Investigate the urban design implications of options to meet Council's environmental target. Particular focus on 'Design and Conservation' issues relating to buildings within Conservation Areas and/or with Listed Building Status.

Eight Associates: Provide a desktop study of the likely measures required to meet the Council's environmental target. Undertake energy modelling and undertake a preliminary assessment of the case studies. Provide an analysis of carbon emission reductions, energy savings and capital expenditure.

# 2. Introduction eight associates

## 2.2 RBKC Targets

### EcoHomes Analysis of RBKC LDF

#### Introduction

This section summarises the background for the RBKC Core Strategy, in particular section CE1(b.i). Firstly, this looks at the iteration process behind development of the Policy Target. It then provides a detailed summary of the resulting target recommendations.

#### Policy Development

The RBKC Core Strategy (Draft) policy CE 1 section b.(i) has been revised following workshops between Council members, architect and environmental consultant. Below is a sequential description of the progress:

Policy Target	Reasons for change
Code for Sustainable Homes (CfSH) Level 4 for all refurbishments and conversions defined as major development.	A preliminary assessment was made for the feasibility of achieving the relevant target and the policy was found to be too ambitious. Site constraints and retrofitting requirements meant that the target was unachievable on a case study.
CfSH Level 2/3 for all refurbishments and conversions defined as major development.	A further assessment found that the reduced target was over ambitious. In particular, it was noted that the CfSH is a methodology designed for new builds and many of the credits were not applicable to retrofit. EcoHomes was therefore identified as a suitable alternative.
EcoHomes VERY GOOD with 50% of credits under the Energy, Water and Materials sections.	The target rating of VERY GOOD was found to be suitable for case studies. However, the mandatory requirement of 50% of the Energy credits was found to be over ambitious in terms of the requirements for carbon emission reductions given site constraints.
EcoHomes VERY GOOD with 40% of credits under the Energy, Water and Materials sections.	The mandatory requirement for carbon emission requirements was reduced and was still found to promote best practice whilst allowing for site constraints.

#### Target

The RBKC Core Strategy (Draft) policy section CE1 is aimed at mitigating RBKC's impact on Climate Change. Section (b.i) of the policy is the focus of this report. Further sections of CE1 are not covered under this report. The following is taken from the relevant section:

*"The Council will require an assessment to demonstrate that conversions and refurbishments defined as major development achieve the following relevant BREEAM standards: i. Residential Development: EcoHomes Very Good (at Design and Post Construction) with 40% of credits achieved under the Energy, Water and Materials sections, or comparable when BREEAM for Refurbishments is published."*

The policy covers planning applications classed as major developments, which constitutes sites with either 10 units or more or with an area of half a hectare or more. The policy sets a target of an EcoHomes 'Very Good' rating plus a mandatory requirement to achieve 40% of credits in each of the following sections of the EcoHomes assessment: Energy, Water and Materials.

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## 2. Introduction

### 2.3 Future Changes in Legislation and Policy Tools

# EcoHomes Analysis of RBKC LDF

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#### Introduction

It is important to note that both Building Regulations legislation and the EcoHomes assessment method are updated regularly. The implications of this are that the next update of Building Regulations Part L, relating to energy use in buildings, will be released in 2010, which will affect the RBKC policy targets. Similarly, the EcoHomes assessment method is updated every couple of years; the next update of this is anticipated for release next year and is likely to make a 'Very Good' rating harder to achieve.

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#### Legislation

Approved Document L1b of the Building Regulations will be revised in 2010 as part of the regular updating of Part L. At present the legislation has not been finalised in view of implementation in 2010. The period of consultation closed in September 2009 and this suggests that certain changes will be made that will have an impact on the Council's policy. These include:

- Evidence and explanations will have to be provided by the 'Design and Conservation Officer' for reasons to not comply with relevant guidance for Listed Buildings and Conservation Area from requirements of Part L1B. Exemptions can still apply, however evidence will have to be provided.
- Revisions to the carbon factors relating to the provision of power to dwellings.
- Incorporation of cooling into calculations for carbon emissions.

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#### EcoHomes

The current version of EcoHomes is expected to be revised by the BRE within the timeframe of RBKC's Core Strategy Policy. The revised scheme will be entitled BREEAM: Refurbishment. Exact details of revisions and timelines are yet to be provided, however it is recommended that the up to date version of the EcoHomes information and standards are included within the RBKC Policy, as this will represent the current best practices and relate adequately to the up to date Building Regulations.

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# 4. EcoHomes Analysis

## 4.1 Assessment Details

### EcoHomes Analysis of RBKC LDF

#### Introduction

The following section takes a 'typical' refurbishment project within RBKC as a case study and assesses the building using EcoHomes 2006 methodology. An explanation of the EcoHomes assessment is provided below.

#### Background

EcoHomes was developed and launched in April 2000 by the Centre for Sustainable Construction at the Building Research Establishment (BRE) with support from the National House Builders Council (NHBC). Its development was steered by a committee of industry representatives and environmental experts.

EcoHomes is an independent, transparent, environmental labelling scheme for housing. The scheme covers houses and apartments, either at the design stage or as part of major refurbishment.

EcoHomes assesses the environmental quality of a development by considering the broad concerns of climate change, use of resources, pollution, and impacts on biodiversity. These concerns are balanced against the need for a high quality internal environment.

#### Issues

The issues assessed by EcoHomes are grouped into the eight category areas listed below:

- **Energy:** Operational energy and CO<sub>2</sub>
- **Transport:** Location issues related to transport
- **Pollution:** Air and water pollution (excluding CO<sub>2</sub>)
- **Materials:** Environmental implications of materials selection, recyclable materials
- **Water:** Consumption issues
- **Ecology and Land Use:** Ecological value of the site, planting and landscaping
- **Health and Well-Being:** Internal and external issues relating to health and comfort
- **Management:** Issues relating to Management of the Construction Process

#### Rating and Scoring System

Credits are awarded under each credit issue, as stated above. Each of the seven issues has an assigned environmental weighting, therefore certain credits (such as water) are worth more of the total score than others (such as management).

The EcoHomes Scale runs from '**PASS**' to '**EXCELLENT**'. To reach a rating, a minimum percentage score is required for each rating band as described in the table below. The final rating is determined by the EcoHomes assessor and quality assured and certified by BRE.

Rating	Min. Score	Environmental performance
Pass	35%	Most developments should be able to achieve this with minor design/ specification changes at a minimal additional cost.
Good	48%	The developer has been able to demonstrate good practice in most areas.
Very Good	58%	Developments pushing forward the boundaries of environmental performance will achieve this.
Excellent	70%	Developments demonstrating exemplary environmental performance across the full range of issues will achieve this.

# 4. EcoHomes Analysis

## 4.2 Policy Requirements

### EcoHomes Analysis of RBKC LDF

#### Introduction

The following section outlines the detailed policy requirement into 4 separate requirements.

#### Policy Requirement 1: EcoHomes VERY GOOD

The site will achieve a minimum score of 58% under EcoHomes thereby achieving a VERY GOOD rating.

#### Policy requirement 2: Achieve at least 40% of the Energy credits under EcoHomes

The site will achieve a minimum 40% of credits in the category relating to Energy as a mandatory requirement.

The issue titles and the number of credits related to each issue within the EcoHomes assessments are as follows:

EcoHomes Issues	No. Credits Available	Description
Carbon Emissions	15	Credit relates to the absolute carbon emissions of the site as calculated under SAP software.
Heat Loss Parameter	2	Credits can be achieved through achieving a Heat Loss Parameter (HLP) as calculated under SAP software through improvements to the building fabric.
Drying Space	1	Credit relates to providing ventilated drying spaces in dwellings.
EcoLabelled White Goods	2	Credit relates to providing white energy efficient white goods.
Internal Lighting	2	Credit relates to providing energy efficient lighting to habitable rooms.
External Lighting	2	Credit relates to providing energy efficient lighting to areas external to the dwellings.

#### Policy requirement 3: Achieve at least 40% of the Water credits under EcoHomes

The site will be required to achieve a minimum 40% of credits in the category relating to Water as a mandatory requirement. The titles and the number of credits related to each issue are:

EcoHomes Issues	No. Credits Available	Description
Internal Water Usage	5	Credit relates to the flow-rate/capacity of showers, taps, baths, white goods and WC.
External Water Usage	1	Credit relates to rainwater harvesting for landscaping.

# 4. EcoHomes Analysis

## 4.2 Policy Requirements

### EcoHomes Analysis of RBKC LDF

Policy requirement 4:  
Achieve at least 40% of the Material credits under EcoHomes

The site will be required to achieve at least 40% of credits in the category relating to Materials as a mandatory requirement under the EcoHomes assessment. The titles and the number of credits related to each issue are as follows:

EcoHomes Issues	No. Credits Available	Description
Environmental Impact of Build-Ups	16	Use of Green Guide for materials to assess various build-ups.
Sustainable Sourcing of Building Elements	6	Sustainable sourcing of main building elements.
Sustainable Sourcing of Finishing Elements	3	Sustainable sourcing of various finishing elements.
Household Waste Recycling	6	Provision of facilities for household waste recycling.

# 4. EcoHomes Analysis

## 4.3 Case Study Results

### EcoHomes Analysis of RBKC LDF

The table and graph below illustrates the full EcoHomes score for the 'typical' refurbishment project within RBKC, as detailed on the following pages. Following this score, the site would achieve a score of 58.45%, which would result in a VERY GOOD rating being achieved.

The policy recommendations – to achieve at least 40% of the energy, water and material credits are met within the case study development, as shown by the graph and table below.

#### Summarised Score

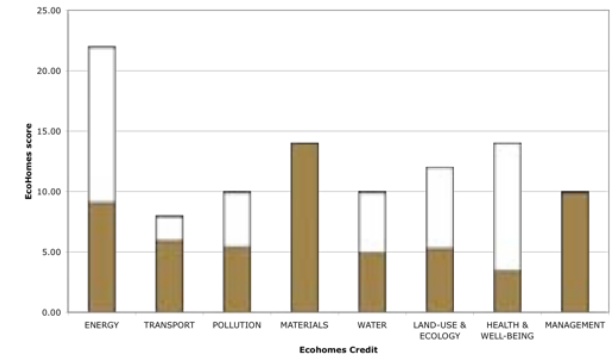
Policy requirement 2 achieved

Policy requirement 4 achieved

Policy requirement 3 achieved

	Credits available	No. Achieved	% Achieved	Weighting Factor	Credits Score
Energy	24	10	41.7	0.22	9.17
Transport	8	6	75.0	0.08	6.00
Pollution	11	6	54.5	0.10	5.45
Materials	31	31	100.0	0.14	14.00
Water	6	3	50.0	0.10	5.00
Land Use and Ecology	9	4	44.4	0.12	5.33
Health and Wellbeing	8	2	25.0	0.14	3.50
Management	10	10	100.0	0.10	10.00
<b>Total</b>					<b>58.45%</b>
<b>Rating</b>					<b>VERY GOOD</b>

#### Graphic Breakdown



# 4. EcoHomes Analysis

## 4.4 Case Study Details

### EcoHomes Analysis of RBKC LDF

The following table gives the broken down EcoHomes score for a 'typical' refurbishment project within RBKC. Following this score, the site would achieve over 58%, resulting in a VERY GOOD EcoHomes rating.

Please note that some credits are deemed to be dependant on the site location and features. These have been identified within the table – highlighted by the ♦ symbol.

EcoHomes Issues	Anticipated Compliance	No. Credits
<b>Energy</b>		
<b>Ene 1 – Dwelling Emissions Rate</b>	The average carbon emission rate (Dwelling Emissions Rate) to be reduced to less than 35 kgCO <sub>2</sub> /m <sup>2</sup> /yr as calculated under accredited SAP software. The carbon emissions to be improved significantly through measures modelled in the report (please see Section 5) including upgrading the building fabric, improving the services and, in certain cases, providing a small proportion of renewables.	2 of 15
<b>Ene 2 – Heat Loss Parameter</b>	The development's Heat Loss Parameter to be reduced to below 2.2 W/m <sup>2</sup> K by implementing the levels of insulation and high performance glazing detailed in the case studies of this report.	1 of 2
<b>Ene 3 – Drying Space</b>	Drying spaces to be provided in the bathroom or the utility room and the ventilation to be controlled by a humidistat.	1 of 1
<b>Ene 4 – Eco-Labelled White Goods</b>	White goods to be provided in line with the following requirements: the fridge-freezer to be A+ rated, the dishwasher to be A rated and the washer dryer to be B rated.	2 of 2
<b>Ene 5 – Internal Lighting</b>	75% of the internal lighting within the habitable rooms of the dwellings to be energy efficient.	2 of 2
<b>Ene 6 – External Lighting</b>	External lighting to the garden or entrance to accommodate fluorescents or LEDs.	2 of 2
<b>Policy Requirement 2</b>	Please note that the above specification would result in 10 out of 24 credits being achieved, which equates to 41.6% of the energy credits being achieved. Policy recommendations include a requirement to achieve at least 40% of the credits under the Energy section. This has been met.	

# 4. EcoHomes Analysis

## 4.4 Case Study Details

### EcoHomes Analysis of RBKC LDF

<b>Transport</b>		
<b>Tra 1 – Public Transport</b>	♦ The development is in close proximity to several bus stops with a good frequency of services. <i>If this is not the case, credits may be lost. This is deemed unlikely within the borough of RBKC.</i>	2 of 2
<b>Tra 2 – Cycle Storage</b>	♦ It is not possible to provide secure storage for 2 cycles for each apartment on site. <i>If the site allows space to be allocated for cycle storage, further credits can be achieved under this issue.</i>	0 of 2
<b>Tra 3 – Local Amenities</b>	♦ The development is within required distances of local amenities. <i>If the site is not within close proximity to local amenities, credits may be lost. However, this is deemed unlikely for developments within the London Borough of RBKC.</i>	3 of 3
<b>Tra 4 – Home Office</b>	A provision for a home office to include two double sockets, a data point and a telephone point along a 1.8m wall space in the secondary bedroom.	1 of 1
<b>Pollution</b>		
<b>Pol 1 – Insulant GWP</b>	Foam based insulation in the to have a global warming potential (GWP) of less than 5.	1 of 1
<b>Pol 2 – NOx Emissions</b>	Efficient condensing boilers to provide heating for the dwelling with a NO <sub>x</sub> emission of less than 40mg/kWh.	3 of 3
<b>Pol 3 – Surface water Runoff</b>	♦ <i>Water attenuation measures, including SUDs, cannot be incorporated in this refurbishment due to site restraints.</i>	0 of 2
<b>Pol 4 – Renewable Energy Source</b>	♦ <i>Renewable energy systems could be incorporated into the current scheme. However, due to site restraints and cost implications it may be difficult to achieve the minimum requirements for this credit.</i>	0 of 3
<b>Pol 5 – Flood Risk</b>	♦ The development is in a low flood risk area. <i>If the development is in a medium or high flood risk zone, credits may be lost if attenuation measures are not installed.</i>	2 of 2



# 4. EcoHomes Analysis

## 4.4 Case Study Details

### EcoHomes Analysis of RBKC LDF

Materials	
<b>Mat 1 – Environmental Impact of Materials</b>	Materials are assessed using the BRE's Green Guide where A rated is the preferred choice. All elements that are retained and therefore re-used in situ earn an A-Rating: The following elements are A-rated: Roof, Windows, Boundary Protection, External Walls, Internal Walls, External surfacing and Upper Floors. 16 of 16
<b>Mat 2 – Responsible Sourcing of Materials: Basic Building Elements</b>	The main building elements such as walls, roof, upper floors, staircase are all elements that are retained and earn the highest rating under this credit. 6 of 6
<b>Mat 3 – Responsible Sourcing of Materials: Finishing Elements</b>	The finishing elements to be sourced from supplies with an FSC or PEFC certification. 3 of 3
<b>Mat 4 – Recycling Facilities</b>	Recycling bin to be provided to the kitchen with a 30 litre capacity, in addition to the waste bin of minimum 30 litres. 6 of 6
<b>Policy Requirement 4</b>	Please note that the above specification would result in 31 out of 31 credits being achieved, which equates to 100% of the materials credits being achieved.  Policy recommendations include a requirement to achieve at least 40% of the credits under the materials section. This has been met.
Water	
<b>Wat 1 – Internal Potable Water Use</b>	Sanitaryware specification to incorporate low flow appliances and fittings. An example specification is as follows: <ul style="list-style-type: none"> <li>• 6/4 dual flush WCs</li> <li>• Showers with flow rate of 9 litres/min</li> <li>• Standard size baths (1700mm x 750mm)</li> <li>• Aerated taps to washbasins</li> <li>• Best performance Dishwashers and Washing Machines</li> </ul> The above specification equates to a water consumption of less than 47 m <sup>3</sup> /bedspace/year, which would result in 2 credits being achieved. 2 of 5
<b>Wat 2 – External Water Use</b>	Provide a 250 litre water butt to harvest rainwater for use on the gardens. 1 of 1
<b>Policy Requirement 3</b>	Please note that the above specification would result in 3 out of 6 credits being achieved, which equates to 50% of the water credits being achieved.  Policy recommendations include a requirement to achieve at least 40% of the credits under the water section. This has been met.

# 4. EcoHomes Analysis

## 4.4 Case Study Details

### EcoHomes Analysis of RBKC LDF

Land Use and Ecology	
<b>Eco 1 - Ecological Value of Site</b> ♦	Site deemed of high ecological value due to the mature trees and hedgerows present on site. 0 of 1  <i>Where a site has existing ecological value, this credit is withheld. Credits awarded where the existing site is of low ecological value.</i>
<b>Eco 2 – Ecological Enhancement</b> ♦	Appoint an ecologist to advise on potential improvements to the landscaping and best practice ecological practices. 1 of 1  <i>Site constraints may mean that this credit is not achievable or cost effective due to the small external areas for potential improvements.</i>
<b>Eco 3 – Protection of Ecological Features</b>	No elements of ecological value to be affected during construction works on site or within the surrounding site. 1 of 1
<b>Eco 4 - Change of Ecological Value of Site</b> ♦	There will be no increase or decrease in ecological value on site as a result of the development. 2 of 4  <i>Two credits are awarded where there is little change in the ecological value of site. Further credits are awarded where ecology is significantly increased on site, usually by following the guidance from a qualified Ecologist.</i>
<b>Eco 5 – Building Footprint</b> ♦	The calculation of gross internal floor area to footprint ratio does not meet 2.5:1. 0 of 2  <i>Dwellings that have 4 storeys will in general achieve this credit. However, three storey dwellings will not achieve this credit.</i>
Health and Wellbeing	
<b>Hea 1 – Daylighting</b> ♦	Daylighting calculations to be carried out to demonstrate that the kitchens and living areas benefit from good daylight. 1 of 3  <i>This credit may be difficult to achieve on sites where the above areas are over-shaded or where the existing property has small existing windows. Further credits are awarded where required rooms achieve a view of sky and good average daylight factors.</i>
<b>Hea 2 – Sound Insulation</b>	No credits awarded, as assumed that acoustic testing will not be carried out in line with EcoHomes requirements. 0 of 4
<b>Hea 3 – Private Space</b> ♦	The development benefits from private amenity space at the rear of the property. 1 of 1  <i>Where no private space is allocated for residents, this credit cannot be achieved, However – if this is the case, credit Wat 2 will be awarded by default.</i>

# 4. EcoHomes Analysis

## 4.4 Case Study Details

### EcoHomes Analysis of RBKC LDF

Management		
<b>Man 1 – Home User Guide</b>	A full home user guide to be provided to include BRE recommended contents.	3 of 3
<b>Man 2 – Considerate Constructors</b>	The site is to be registered under Considerate Constructors Scheme and will show compliance with best practice site management principles. The site is to achieve a score of at least 32/40.	2 of 2
<b>Man 3 – Construction Site Impacts</b>	<p>The contractor to undertake the following:</p> <ul style="list-style-type: none"> <li>Sort and monitor waste and recycle at least 5 types of construction waste material</li> <li>Adopt best practice policies in respect of water (ground and surface) pollution occurring on site</li> <li>Adopt best practice policies in respect of air (dust) pollution arising from site activities.</li> <li>Monitor and set consumption targets for on-site energy usage</li> <li>Monitor and set consumption targets for on-site water usage</li> </ul>	3 of 3
<b>Man 4 – Security</b>	The design team will work with an Architectural Liaison Officer and will incorporate all relevant 'Secured by Design' principles within the scheme – including meeting security standards for external doors and windows.	2 of 2

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# 5. Carbon Savings Analysis

## EcoHomes Analysis of RBKC LDF

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### Introduction

Three properties within the Borough have been chosen to be modelled as part of the carbon savings analysis. These properties were chosen to best identify typical design and conservation issues within the Borough when implementing carbon savings measures. The properties chosen are as follows:

- 48 Addison Avenue due to its status as a Grade II Listed Building.
- 44 Markham Square due to its location within a Conservation Area.
- 102 Princedale Road considered as located in a Conservation Area (option 1).
- 102, Princedale Road considered as not located in a Conservation area (option 2).

The following section contains the following information:

- 1) Drawings and photographs of the existing site are provided for each property showing the site location and the layouts.
- 2) An EcoHomes score based on the analysis in section 4 and carbon saving measures to meet the required 40% of energy credits. Modelling data is also provided showing fuel savings, carbon savings and capital expenditure.
- 3) Drawings and photographs of the proposed site showing the likely Design and Conservation implications of the carbon saving measures.

The dwellings have been modelled using SAP 2005 software to determine if the carbon emissions rate of 35 kgCO<sub>2</sub>/m<sup>2</sup>/yr is attainable in line with policy requirements. The carbon emissions figure has been taken from the Dwelling Emission Rate (DER).

Furthermore, a cost effectiveness analysis has been undertaken in order to provide a hierarchy of carbon savings measures. For each measure the impact in terms of predicted fuel savings, carbon savings and capital expenditure has been modeled. The measures have been modeled in a cumulative process where each carbon savings measure is analysed in addition to the previous measures.

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### Cost effectiveness

The effectiveness of each measure has been calculated in terms of lifecycle value associated with saving 1 tonne of carbon or the pound per kilogram of carbon saved (£/kgCO<sub>2</sub> saved). This measure takes into account the fuel savings over 60 years, the capital and replacement costs over 60 years and the carbon saved over 60 years.

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### Hierarchy of Measures

Based on the modeling within this report, the carbon saving measures that improved the thermal performance of the building fabric will generate larger fuel savings than their capital requirement. The renewable energy systems are less effective in terms of fuel savings and carbon savings, taking into account capital expenditure over the lifecycle of the system.

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A

Example 1  
Site map - 48 Addison Avenue



B

Example 2  
Site map - 102 Princesdale Road

OPTION 1: External rear render and double glazed windows  
OPTION 2: External front and rear render and casement windows



C

Example 3  
Site map - 44 Markham Square



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## Revisions

Rev A - notes amended - 28.10.09

## Other notes

Existing drawings supplied by Eight Associates

## Project Address

RBKCEH Feasibility

## Drawing

Site maps

## Drawing status

For Discussion Purposes Only

## Date

01.10.09

Drawing number  
0915 SIT01

## Scale

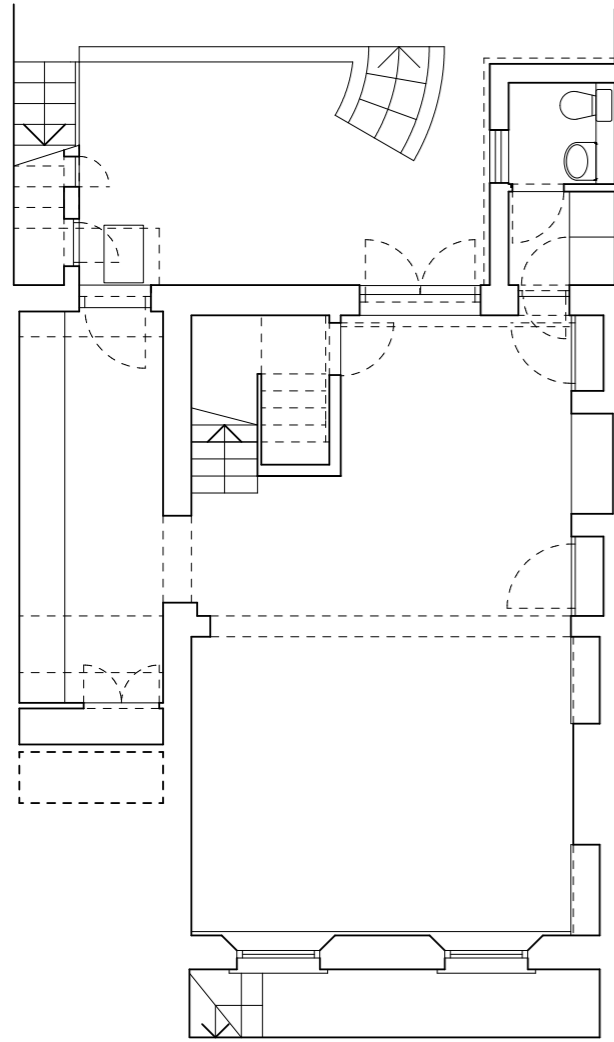
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## Revision

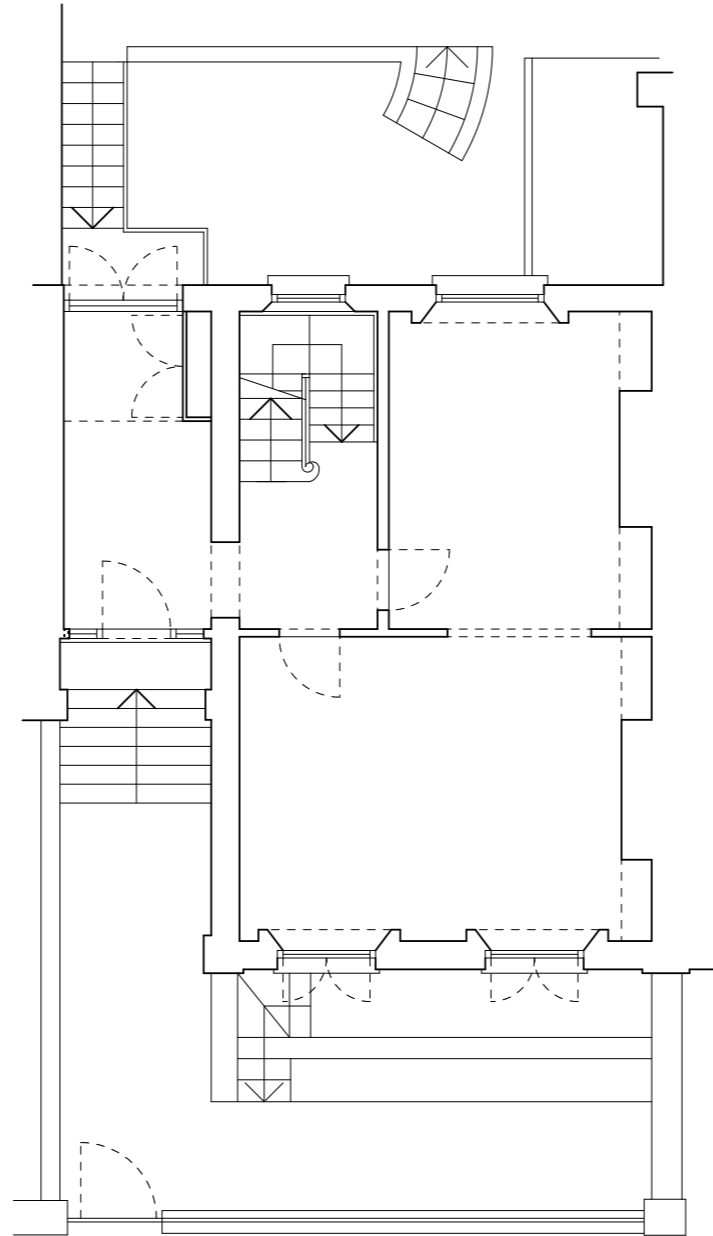
A



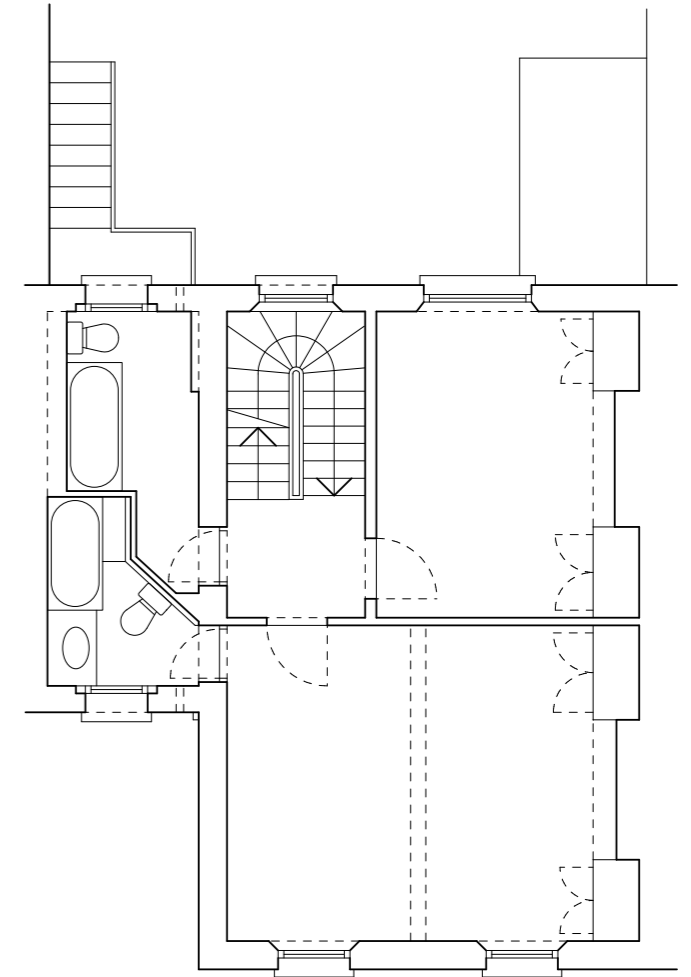
# Example 1 - Listed Building Existing plans



**A** Existing lower ground floor plan



**B** Existing upper ground floor plan



**C** Existing first floor plan



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**Revisions**

Rev A - notes amended - 28.10.09

**Other notes**

**Project Address**

RBKC EH Feasibility  
48 Addison Avenue

**Drawing**

Existing lower and upper  
ground floor and first floor  
plans

**Drawing status**

For Discussion Purposes Only

**Date**

01.10.09

**Drawing number**  
0915 AA01

**Scale**

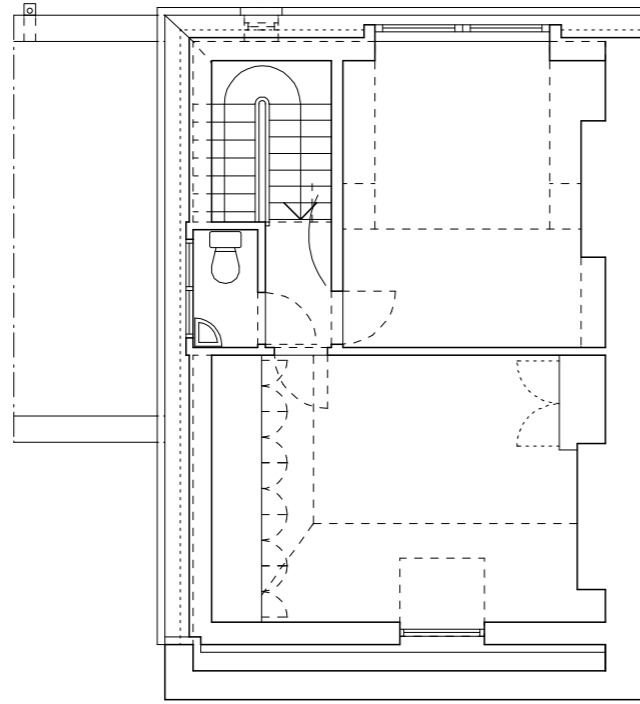
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**Revision**

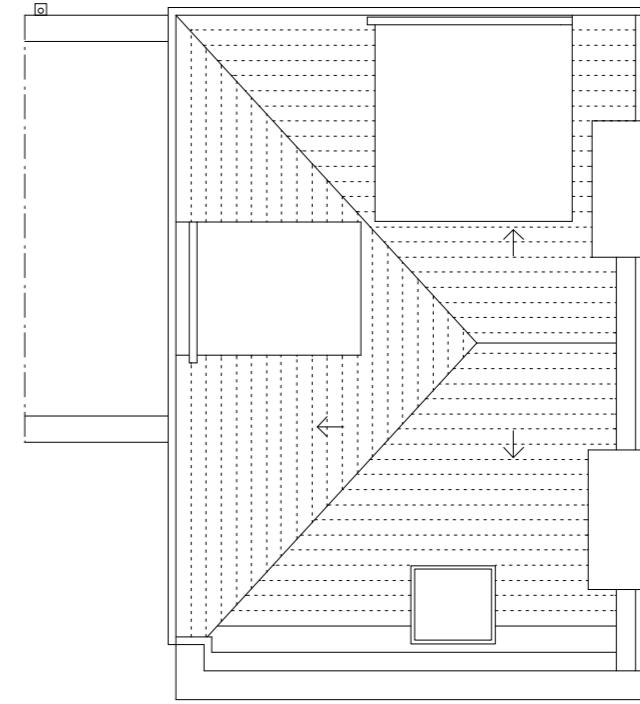
A



# Example 1 - Listed Building Existing plans



**A** Existing second floor plan



**B** Existing roof plan



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Revisions

Rev A - notes amended - 28.10.09

Other notes

Project Address

RBKC EH Feasibility  
48 Addison Avenue

Drawing

Existing second floor plan  
and roof plan

Drawing status

For Discussion Purposes Only

Date

01.10.09

Scale

1:100 @ A3

Drawing number

0915 AA02

Revision

A

# Example 1 - Listed Building Existing elevations



← 48 Addison Avenue →



**B** Existing Rear Elevation

**A** Existing Front Elevation



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#### Revisions

Rev A - notes amended - 28.10.09

#### Other notes

#### Project Address

RBKC EH Feasibility  
48 Addison Avenue

#### Drawing

Existing front and rear  
elevations

#### Drawing status

For Discussion Purposes Only

Date  
01.10.09

Scale  
1:100 @ A3

Drawing number  
0915 AA03

Revision  
A



Example 1 - Listed Building  
Existing photographs



50 48 46

A Street view from Addison Avenue



48

B Photo from rear garden

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Revisions

Rev A - notes amended - 28.10.09

Other notes

Existing drawings supplied by Eight Associates

Project Address

RBKC EH Feasibility  
48 Addison Avenue

Drawing

Photographs

Drawing status

For Discussion Purposes Only

Date  
01.10.09

Scale  
n.t.s.

Drawing number  
0915 AA04

Revision  
A



Example 1 - Listed Building  
Existing glazing photographs



**A** Street view from Addison Avenue



**B** Existing front LGF window single glazed sash



**C** Existing detail of single glazed sash window

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Revisions

Rev A - Notes amended - 28.10.09

Other notes

Project Address

RBKC EH Feasibility  
48 Addison Avenue

Drawing

Images of existing windows

Drawing status

For Discussion Purposes Only

Date  
01.10.09

Scale  
n.t.s.

Drawing number  
0915 AA08

Revision  
A