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PROJECT QUAD

London NW1 4JL

Sustainability Plan

Issue 1 **12 Nov 2015**

AS A COMPLETE PDF DOCUMENT, THIS HAS 100 PAGES.

DOCUMENTS ISSUED WITH THIS REPORT

ECOHOMES ISSUE / REFERENCE	DOCUMENT
All Issues	EcoHomes Compliance Matrix
All Issues	EcoHomes Preliminary Report for Project Quad
POL 5: Flood Risk	Flood Risk Assessment by Herrington Consulting Ltd, Nov 2015
ECO 1-4: Ecology	Ecological Assessment by Middlemarch Environmental, Oct 2015

Index and summary of contents

1 EXECUTIVE SUMMARY

1.1 The project proposal is for the reconfiguration of the three approved residential properties (6-10 Cambridge Terrace, 1 Chester Gate and 2 Chester Gate) to become 6-8 Cambridge Terrace, 9-10 Cambridge Terrace + 1 Chester Gate and 2 Chester Gate.

1.2 There are various targets, set by the Local Planning Authority (Camden) for:

1. A minimum EcoHomes rating of Very Good or Excellent;
2. Within the EcoHomes 'Energy' Category, score at least 25% of the credits and use reasonable endeavours to attain 60%;
1. Within the EcoHomes 'Water' Category, use reasonable endeavours to attain 60% of the credits;
3. Within the EcoHomes 'Materials' Category, score at least 70% of the credits;
4. Target a reduction in carbon energy emissions by 33% through use of combined heat & power (CHP) and other approved initiatives.

1.3 One key aspect of the sustainability targets is the carbon dioxide (CO2) emissions assessment and energy efficiency strategy:

1. CO2 emissions are assessed using the Building Research Establishment (BRE) Standard Assessment Procedure (SAP) tool. SAP 2005 was used to model the units to demonstrate their contribution to the BRE EcoHomes Assessment Energy Category;
2. SAP 2012 was used to demonstrate the CO2 emissions reductions for each dwelling when compared to a notional base case derived using Part L and BRE guidance;
3. Each unit will target at least 33% reductions in CO2 emissions by implementing appropriate energy efficiency measures;
4. The mix of energy efficiency measures proposed for each individual unit is unique and limited by feasibility and heritage;
5. Proposed mix of energy efficiency measures includes the following:
    - Performance improvements to the existing thermal envelope
    - Completely new building services systems and controls
    - Air source heat pumps
    - Ground source heat pumps
    - Combined heat and power
    - Heat recovery ventilation systems
    - Energy efficient lighting.

1.4 Building services proposed systems

- 9-10 Cambridge Terrace and 1 Chester Gate
    - A ground source heat pump system comprising vertical bore holes installed below basement level will provide for 100% of cooling demands and contribute to the heating demands through the use of a warm and cold thermal store;
    - To support the ground source installation on the heating a micro CHP engine will be installed with thermal store. Gas fired condensing boilers will provide further top up during periods of peak demand associated with the domestic hot water system;
    - Heating for the pool water and pool ventilation systems are derived from the ground source system;
    - Ventilation systems include heat recovery.
- 6-8 Cambridge Terrace
    - An air source heat pump will be provided with gas boiler back up for providing hot water and heating services. A VRF system will be installed to provide comfort cooling. MVHR units will be provided for ventilation.
- 2 Chester Gate
    - An air source heat pump will be provided with gas boiler back up for providing hot water and heating services. A VRF system will be installed to provide comfort cooling. MVHR units will be provided for ventilation.

2 ECOHOMES COMPLIANCE MATRIX – FOLLOWS

2.1 This matrix details how all three properties will comply with the EcoHomes Very Good rating and various Categories within.

3 ECOHOMES PRELIMINARY REPORT – FOLLOWS

3.1 This EcoHomes Prelim report covers all three properties, as suitable for this one whole development site.

3.2 The development site is registered with the BRE for assessment under EcoHomes 2006; Reg No BREEAM-0060-2417.

3.3 The full EcoHomes assessment process for this development site will normally result in a Design Stage Certificate, followed at an appropriate time by a Post Construction Review Certificate to show compliance for all three properties within one assessment report.

4 FLOOD RISK ASSESSMENT – FOLLOWS

4.1 This FRA report details the research and calculation work to prove that the site is within a Low flood risk area.

4.2 This result scores under the EcoHomes Category of Pollution, in issue POL 5.

5 ECOLOGICAL ASSESSMENT – FOLLOWS

5.1 This Ecological report details the research and calculation work to prove the EcoHomes points that the combination of the existing site and the landscaping proposals will attain.

5.2 The report results attain varying scores under the EcoHomes Category of Ecology, in issues ECO 2 and ECO 4.

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ECOHOMES COMPLIANCE MATRIX

JOB NAME	Project Quad	JOB NUMBER	081179
DATE	12/11/2015	WORK COMMISSIONED	EcoHomes Compliance

KEY:	EcoH Issue	The EcoHomes criteria are divided into 33 Issues, each of which has a potential maximum score, marked in Credits. All Issues are within one of eight Categories (Energy, Transport, Pollution, Materials, Water, Ecology, Health and Management). One Credit does not equal one percent. Some Categories score more percentage points per credit than others.
	Specs	This text briefly summarises what is contained, in detail, within the EcoHomes Compliance Specifications, as issued to the Contractor.
	Avge	This indicates whether the Issue can be 'averaged' across all dwellings and if so, what the resultant average score is. Some Issues can be scored for all dwellings based upon a certain percentage of the total number of dwellings which meet the criteria, and in this case the qualifying percentage is shown; for absolute clarity, if a Pass requires 50% then 2 in 4 dwellings must comply.

ECOH ISSUE	9-10 CAMBRIDGE TERR. + 1 CHESTER GATE		6-8 CAMBRIDGE TERRACE		2 CHESTER GATE		AVGE
	Credits	Specs	Credits	Specs	Credits	Specs	
Ene1 DER	11	SAP 2005 DER=12.26. SAP results based upon design fabric performance & HVAC systems.	10	SAP 2005 DER=16.35. SAP results based upon design fabric performance & HVAC systems.	10	SAP 2005 DER=17.81. SAP results based upon design fabric performance & HVAC systems.	10
Ene2 HLP	1	SAP 2005 HLP=1.78. Designed insulation.	2	SAP 2005 HLP=1.44. Designed insulation.	2	SAP 2005 HLP=1.68. Designed insulation.	2
Ene3 Drying Space	0	Compliance not targetted	0	Compliance not targetted	0	Compliance not targetted	n/a
Ene4 White Goods	2	Good EU Efficiency Ratings for relevant products	2	Good EU Efficiency Ratings for relevant products	2	Good EU Efficiency Ratings for relevant products	n/a

ECOH ISSUE	9-10 CAMBRIDGE TERR. + 1 CHESTER GATE		6-8 CAMBRIDGE TERRACE		2 CHESTER GATE		AVGE
	Credits	Specs	Credits	Specs	Credits	Specs	
Ene5 Internal Lighting	2	>75% fixed fittings to be Low E	2	>75% fixed fittings to be Low E	2	>75% fixed fittings to be Low E	n/a
Ene6 External Lighting	2	All fittings Low E and/or PIR & Daylight controlled	2	All fittings Low E and/or PIR & Daylight controlled	2	All fittings Low E and/or PIR & Daylight controlled	n/a
Tra1 Public Transpt.	2	Good Public Transport & links	2	Good Public Transport & links	2	Good Public Transport & links	Pass= 80%
Tra2 Cycle Store	2	Secure & weatherproof storage for at least 4no bikes	2	Secure & weatherproof storage for at least 4no bikes	2	Secure & weatherproof storage for at least 4no bikes	Pass= 50% or 95%
Tra3 Local Amenity	3	Good access to relevant local amenities	3	Good access to relevant local amenities	3	Good access to relevant local amenities	Pass= 80%
Tra4 Home Office	1	Space & services for a Home Office	1	Space & services for a Home Office	1	Space & services for a Home Office	n/a
Pol1 GWP	1	All insulants have GWP<5	1	All insulants have GWP<5	1	All insulants have GWP<5	n/a
Pol2 NOx	0	Compliance not targetted	0	Compliance not targetted	0	Compliance not targetted	n/a
Pol3 Surface Runoff	0	Compliance not targetted	0	Compliance not targetted	0	Compliance not targetted	n/a
Pol4 Ren. Energy	0	Compliance not targetted	0	Compliance not targetted	0	Compliance not targetted	avge

ECOH ISSUE	9-10 CAMBRIDGE TERR. + 1 CHESTER GATE		6-8 CAMBRIDGE TERRACE		2 CHESTER GATE		AVGE
	Credits	Specs	Credits	Specs	Credits	Specs	
Pol5 Flood Risk	2	Low Flood Risk site	2	Low Flood Risk site	2	Low Flood Risk site	n/a
Mat1 Green Guide	10	Calculations done using material specifications	10	Calculations done using material specifications	10	Calculations done using material specifications	n/a
Mat2 Basic Sourcing	6	EMS certification for most materials used	6	EMS certification for most materials used	6	EMS certification for most materials used	n/a
Mat3 Finish Sourcing	0	Compliance untested	0	Compliance untested	0	Compliance untested	n/a
Mat4 Recycled Waste	6	Recycling facilities matched to collection regime	6	Recycling facilities matched to collection regime	6	Recycling facilities matched to collection regime	n/a
Wat1 Internal Water	The internal water calculations and associated WAT1 Table show a design compliance with the maximum water usage rate of 42m3 / bedspace / year. However, the exceptional rule for swimming pools under BRE's Technical Query Guidance for EcoHomes states that the first fill of any swimming pool and similar large water features can be performed using mains supply water, but that subsequent top ups must be provided by using 100% rainwater or 100% recycled water. The predicted local rainfall rate for this site is, unusually, insufficient to supply the pool with enough rainwater to balance the pool evaporation rate. The re-use of all possible hard surface rainwater from the site is further complicated by the extensive and specialised treatment which would be required to counteract the various contaminants, including roofing lead, vehicle fuel and road tar. As the Pool criteria cannot be met, therefore the overall result is a FAILURE TO COMPLY with this Issue, even though the fixtures & fittings will be specified for good water efficiency.						avge design use in litres/ bed-space/ day
Wat2 External Water	1	Rainwater collection will be used for irrigation	1	Rainwater collection will be used for irrigation	1	Rainwater collection will be used for irrigation	n/a
Eco1 Ecology	0	Compliance not targetted	0	Compliance not targetted	0	Compliance not targetted	whole site

ECOH ISSUE	9-10 CAMBRIDGE TERR. + 1 CHESTER GATE		6-8 CAMBRIDGE TERRACE		2 CHESTER GATE		AVGE
	Credits	Specs	Credits	Specs	Credits	Specs	
Eco2 Enhance Ecology	1	Enhancement of ecological features	1	Enhancement of ecological features	1	Enhancement of ecological features	whole site
Eco3 Protect Ecology	0	Compliance not targetted	0	Compliance not targetted	0	Compliance not targetted	whole site
Eco4 Change Ecology	3	Positive change in species by between +3 and +9	3	Positive change in species by between +3 and +9	3	Positive change in species by between +3 and +9	whole site
Eco5 Foot-print	2	Full compliance for Floor Area: Footprint ratio	2	Full compliance for Floor Area: Footprint ratio	2	Full compliance for Floor Area: Footprint ratio	avge >2.5:1
Hea1 Daylight	0	Compliance not targetted	0	Compliance not targetted	0	Compliance not targetted	n/a
Hea2 Sound	4	Party Elements to be >/= 5dB > Bdg Regs.	4	Party Elements to be >/= 5dB > Bdg Regs.	4	Party Elements to be >/= 5dB > Bdg Regs.	n/a
Hea3 Ext Space	0	Compliance not targetted	0	Compliance not targetted	0	Compliance not targetted	n/a
Man1 HUG	3	Home User Guide to be provided	3	Home User Guide to be provided	3	Home User Guide to be provided	n/a
Man2 CCS	2	Considerate Constructors 'Beyond Best Practice' certificate to be achieved	2	Considerate Constructors 'Beyond Best Practice' certificate to be achieved	2	Considerate Constructors 'Beyond Best Practice' certificate to be achieved	n/a
Man3 Site Impacts	3	Contractor to recycle, monitor water use & prevent dust & ground-water pollution	3	Contractor to recycle, monitor water use & prevent dust & ground-water pollution	3	Contractor to recycle, monitor water use & prevent dust & ground-water pollution	n/a
Man4 Security	1	To be Secured By Design compliant	1	To be Secured By Design compliant	1	To be Secured By Design compliant	n/a

OVERALL ECOHOMES SCORE & RATING							
PLANNING TARGET COMPLIANCE PERCENTAGES	ECOHOMES Very Good (58.00%)	62.83%	ENERGY (25%)	75%	WATER (60%)	Fail*	* See compliance explanation in Table above in WAT1
			MATERIALS (70%)	70.97%	ENERGY (60%)	75%	Pass

<END OF MATRIX>

ECOHOMES 2006 - FOR PLANNING

THE ENVIRONMENTAL RATING FOR HOMES

PRELIMINARY ECOHOMES ASSESSMENT

INCLUDING ANY ASSUMPTIONS AND BASIS FOR DATA

PROJECT QUAD, NW1 4JL

for Project Quad Ltd

Issue Date: 12/11/2015

BRE reference no: BREEAM-0060-2417

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INTRODUCTION

This document was written by Julian Williams of Abba Energy Ltd, a qualified and highly experienced EcoHomes Assessor. It should be read in conjunction with the "EcoHomes Rating Sheet", included at the rear of this report. There are THREE units being assessed in this scheme: 6-8 Cambridge Terrace, 9-10 Cambridge Terrace/1 Chester Gate and 2 Chester Gate.

This report reviews the current standing of this scheme, employing verbal and available design information. Information is not yet available to enable a Design Stage (DS) assessment to be undertaken. The DS stage would be followed by a Post Construction Review, resulting in PCR certification.

Following this report (and where issued by Abba Energy), it will be the project team's responsibility to ensure that the drawings and specifications follow and clearly state the requirements for the relevant EcoHomes issues . Information should then be submitted to the EcoHomes Assessor for the Final report to be made. Please note that without the evidence the assessor cannot award the credits. Reference should be made to EcoHomes 2006 Guidance Criteria (available on the following internet address: www.breeam.org/pdf/EcoHomes2006Guidance_v1_2_April2006.pdf)

Project name	**PROJECT QUAD, NW1 4JL**		**EcoHomes Version**	**2006**
Client	**Project Quad Ltd**		**Preliminary Rating Achieved**	**VERY GOOD**
Assessment Type	**PRELIMINARY**		**Target Rating**	**VERY GOOD**

PLANNING & SECTION 106 REQUIREMENTS

There is a Planning Section 106 requirement (S106 dated 07/09/2010, Section 2.32 "the Sustainability Plan") to achieve: an EcoHomes rating of Very Good or Excellent; at least 25% of the Energy Category credits; at least 70% of the Materials Category credits; use reasonable endeavours to achieve 60% of the Energy Category and Water Category credits; providing justification for any shortfall in meeting these targets.

ECOHOMES CATEGORY	AVAILABLE MAXIMUM CREDITS	PROPOSED CREDITS	25%	60%	70%
ENERGY	24	**18**	**YES**	**YES**	**-**
WATER	6	**1**	**-**	**NO**	**-**
MATERIALS	31	**22**	**-**	**-**	**YES**

PLANNING COMPLIANCE - JUSTIFICATION

The Target Rating of Very Good will be achieved. The percentage targets for individual Issues will be achieved EXCEPT for Issue WAT1 (Internal Potable Water Use). The internal water calculations and associated WAT1 Table show a design compliance with the maximum water usage rate of 42m3 / bedspace / year. However, the exceptional rule for swimming pools under BRE's Technical Query Guidance for EcoHomes states that the first fill of any swimming pool and similar large water features can be performed using mains supply water, but that subsequent top ups must be provided by using 100% rainwater or 100% recycled water. The predicted local rainfall rate for this site is, unusually, insufficient to supply the pool with enough rainwater to balance the pool evaporation rate. The re-use of all possible hard surface rainwater from the site is further complicated by the extensive and specialised treatment which would be required to counteract the various contaminants, including roofing lead, vehicle fuel and road tar. Refer to individual Issues for source calculations, design reasoning and any additional justification of compliance and non-compliance.

PRELIMINARY ASSESSMENT

The following table includes the basis of data input, sources and assumptions. Each issue is 'weighted' differently, to reflect considered importance, according to the following equivalent percentage scores per single EcoPoint: Energy (Ene) – 0.92%; Transport (Tra) – 1.00%; Pollution (Pol) – 0.91%; Materials (Mat) – 0.45%; Water (Wat) – 1.67%; Ecology (Eco) – 1.33%; Health & Wellbeing (Hea) – 1.75%; Management (Man) - 1.00%. Where credits have been awarded, it is assumed that the criteria (detailed within the relevant version of the EcoHomes Guidance) will be met.

Please note: MA=Moxley Architects, BU=Bouygues UK, CB=Chapman BDSP, AE=Abba Energy, HC=Herrington Consulting, MM=Middlemarch.

References to 'dwelling' mean a unit of accommodation, house or flat.

ISSUE	COMMENT	DATA BASIS & SOURCES	SCORE (ECOPOINTS)	MAX SCORE & %
Energy				
Ene1	**Dwelling Emission Rate:** Purpose of this category is to minimise carbon dioxide (CO2) emissions to the atmosphere arising from the operation of a home and its services.	Calculated SAP 2005 results of **DER=15.47** from CB received 10/11/2015.	10	15 = 13.75%
Ene2	**Building Fabric:** Purpose of this category is to improve the efficiency of dwellings over their whole life.	Calculated SAP 2005 results of **HLP=1.63** from CB received 10/11/2015. NB- The Heat Loss Parameter is a useful summary of the rate of loss of heat from the dwelling per unit floor area. It is calculated as the specific loss divided by the total floor area. The range of variation of HLP is typically from 6 for a very badly insulated old dwelling to 1 for a super-insulated dwelling, and can usually be effectively improved by using better insulation and increased air tightness.	2	2 = 1.83%
Ene3	**Drying Space:** Purpose of this category is to minimise the amount of energy used to dry clothes	Under discussion but currently NOT required.	0	1 = 0.92%
		Specific reference to the Guidance criteria will be made to ensure compliance with EITHER internal OR external provision as follows: • **Internal space:** – an unheated space with good natural ventilation, or – a heated space with adequate, controlled ventilation, i.e. extract fan with humidistat or passive vents. – the space must not be supplied with additional heating for the purposes of drying clothes. – If heated towel rails are provided they MUST be 'sized' for space heating purposes only and not for drying clothes. No other heat emitter should be used in the room designated for drying clothes. – Fixings/fittings to hold a minimum of 6m line for three (or more) bed units, or 4m for one or two bed units.		

ISSUE	COMMENT	DATA BASIS & SOURCES	SCORE (ECOPOINTS)	MAX SCORE & %
Ene4	**EcoLabelled Goods:** To maximise the provision or purchase of energy-efficient white goods.	White goods will be provided in all units. Washer-dryers and tumble dryers to be B rated, washing machines and dishwashers to be 'A' rated, and fridges, freezers and fridge/freezers to be A^+ rated under the EU Energy Efficiency Labelling Scheme. Therefore 2 credits have been awarded. Source MA	2	2 = 1.83%
Ene5	**Internal Lighting:** To encourage the provision of energy efficient internal lighting.	At least 75% of fixed internal light fittings will be specified as having energy efficient luminaires for ALL dwellings in the development. Source MA NB - An energy efficient luminaire must have a luminous efficacy greater than 45 lumens per circuit Watt. Tubular fluorescent and compact fluorescent lighting fittings would meet this requirement. GLS tungsten lamps or tungsten halogen lamps would not comply. Only fixed internal light fittings in an habitable room are to be included.	2	2 = 1.83%
Ene6	**External Lighting:** To encourage the provision of energy efficient external lighting.	**Space Lighting:** All external space lighting (including feature lighting & lighting to common areas) will have of energy efficient lamps with an efficacy of 40 lumens per circuit-watt or better (such as compact fluorescent lamps or strip lights). For the purpose of this credit areas include external door, front porch, patio, garage, garden, carports and any other outbuildings. **Security Lighting:** All security lighting will be designed for energy efficiency and will be adequately controlled such that – all intruder lighting has a maximum wattage of 150 W AND be fitted with movement detecting shut-off sensors (PIR) AND daylight cut-off devices. – all other type of security lighting to have lamps with an efficacy of greater than 40 lumens per watt and be fitted with dawn to dusk sensors or timers. Both credits are therefore achieved. Source MA	2	2 = 1.83%
Transport				
Tra1	**Public Transport:** To encourage developers to provide a choice of transport modes for residents with the aim of reducing the level of car use.	The site is located in an urban/ sub-urban location. At least 80% of the development is within **500m** (via a safe walking route) of a transport node providing a service to a local centre, town, city or a major transport node, at the following frequency levels: · 07:30 – 10:00 and 17:00 – 19:00 Monday to Friday – every 15 min · All other times between 07:00 and 22:00 Monday to Saturday – half hourly. Source MA	2	2 = 2.00%

ISSUE	COMMENT	DATA BASIS & SOURCES	SCORE (ECOPOINTS)	MAX SCORE & %
Tra2	**Cycle Storage:** To encourage the wider use of bicycles as transport, and thus reduce the need for short car journeys, by providing adequate and secure cycle storage facilities.	A total of at least 4no covered cycle spaces have been provided on site, in accordance with the EcoHomes guidance criteria. Source MA **Space requirements:** – space for 4 cycles for four-bed dwellings and above The minimum storage area to be provided where a propriety storage system is **not** being used, or the cycles are not on hanging mountings, is: 4 cycles: 2 x 2.5m. **NB - The storage needs to be secure and weather-proof (with at least three walls and a roof).** This is achieved either by: – storing the cycle(s) in a secure structure with a secure entrance lock (a permanent lock – not a padlock) OR – locking the cycle(s) to a secure fixing(s), e.g. steel fixing set in concrete (for communal storage areas individual secure fixings are always required). Note: Fixings should allow both a wheel and the frame to be locked securely. If a specially designed cycle store facility is **not** available, storage can be allowed in other areas, providing the cycles are not prohibiting the intended use of that area. Examples include the following: **Garages** – Whether stored on the floor or in a hanging position, there must be enough space to store both the bicycle(s) and the car(s) at the same time. You must be able to get the bicycle(s) in and out when the car(s) are parked in the garage, and there should be enough space to move around without a risk of scratching the car(s).	2	2 = 2.00%
Tra3	**Local Amenities:** To encourage developers to plan new housing developments that are close to, or include local shops and amenities. This will help to reduce the reliance local residents have on their cars.	The development is within 500m walking distance of a food shop and a post box. At least 5no out of 10 compliant local amenities (postal facility, food shop ,bank/cash point, pharmacy, primary school, medical centre, leisure centre, community centre, place of worship, public house, children's play area, outdoor open access public area) are within 1000m of the development. All compliant amenities are accessible via safe pedestrian routes, therefore 2 credits have been awarded. Source AE The post box and food shop within 500m are accessible via safe pedestrian routes. Therefore 1 credit has been awarded. Source AE	3	3 = 3.00%

ISSUE	COMMENT	DATA BASIS & SOURCES	SCORE (ECOPOINTS)	MAX SCORE & %
Tra4	**Home Office:** To reduce the need to commute to work by providing residents with the necessary space and services to be able to work from home.	At least one room will be provided to allow the occupants to set up a home office and its services according to EcoHomes Guidance criteria. Source MA	1	1 = 1.00%
		NB- For one and two bedroom or studio homes, the space may be in the living room, one of the bedrooms or any other suitable area in the home such as a large hall or dining area (provided the minimum service requirements (below) are met).		
		NB- The room must be large enough not to prevent the intended use of that room i.e. if a home office is to be set up in the main bedroom that room also needs to be able to fit in a double bed and other necessary furnishing. For other units this could be in the second bedroom without use restriction.		
		NB – Requirements include adequate ventilation (opening window or other provision); two data/telephone and two double power points in one wall that is 1.8m (bed or studio) or longer. The sockets should be positioned on this wall to avoid the use of extension leads at the desk.		
Pollution				
Pol1	**Insulant GWP:** To reduce the potential global warming from substances used in the manufacture or composition of insulating materials.	All insulating materials will have zero ODP (Ozone Depletion Potential) and a GWP (Global Warming Potential) of less than 5. Elements relevant for this credit are roof (including loft access), internal and external walls (including doors and lintels), floors (including foundations), hot water cylinder, pipe insulation and other thermal stores. Source MA	1	1 = 0.91%
		NB- Typical materials that do inherently have a zero ODP and GWP include: Mineral fibre, glass fibre, cork, cellular glass, expanded (bead) polystyrene, nitrile rubber, cellulose insulation, wood fibre board, wool, flax or recycled newspaper and jute.		
Pol2	**NOx Emissions:** To reduce the nitrous oxides emitted into the atmosphere.	Compliance with this Issue is under scrutiny. Calculation witth regard to the heating system supply side, including CHP, fireplaces and electric heating of all types must be taken into account. In the meantime the Worst Case assumption of a zero score is in place.	0	3 = 2.73%

ISSUE	COMMENT	DATA BASIS & SOURCES	SCORE (ECOPOINTS)	MAX SCORE & %
Pol3	**Reduction of Surface Runoff:** To reduce and delay water run-off from the hard surfaces of a housing development to public sewers and watercourses, thus reducing the risk of localised flooding, pollution and other environmental damage.	Compliance not targetted. **<u>To achieve compliance, the rainwater holding facility and/ or sustainable drainage technique shall be designed to comply with the following;</u>** – Holding facilities should discharge from full to half volume within 24 -48 hours of the storm event in readiness for subsequent storm inflow. – Where a statutory body requires greater attenuation and/ or a more onerous design flooding frequency than that recommended in BS EN752-4, then the higher requirement should be met in order to achieve these credits. – Run-off from vehicular areas and other areas subject to potential pollution risks need to be covered by appropriate pollution-control measures such as interceptors, etc.	0	2 = 1.82%
Pol4	**Renewable and Low Emission Energy Source:** To reduce atmospheric pollution by encouraging locally generated renewable and low emission energy to supply a significant proportion of a development's energy demand.	No specific and calculated provision has been made for compliance with this Issue, but the potential for compliance within Conservation considerations has been under discussion.	0	3 = 2.73%
Pol5	**Flood Risk:** To encourage developments in areas with low risk of flooding. Alternatively, if developments are to be situated in areas with a medium risk of flooding, reduce the impact of flooding through appropriate measures.	The development is situated in an area (flood zone) that is defined as having a low annual probability of flooding, taking into account all potential flood sources. This was verified by Herrington Consulting, which carried out a full FRA report in accordance with National Guidelines. Source HC	2	2 = 1.82%

ISSUE	COMMENT	DATA BASIS & SOURCES		SCORE (ECOPOINTS)	MAX SCORE & %
Materials					
Mat1	**Environmental impact of Materials:** To encourage the use of materials that have less impact on the environment, taking account of the full life cycle. Only 'A' rated specifications, for 80% by area of each element, will score.	**Roof** – Roof replaced with re-used lead and other compliant materials (A)	3	10	16 = 7.23%
		External Walls – Substantial re-use of existing fabric (A);	3		
		Internal Walls - *partitions walls & party walls* – Preliminary calculations indicate a ratio of approximately 54% A-rated materials to 46% non-A-rated materials (by elevational area);	0		
		Floors – *ground* - new concrete floor (B/C) - est <20% by plan area;	0		
		upper floors - re-used in situ - est <20% by plan area (A);			
		Windows – Timber frame (A);	2		
		Hard Landscaping – re-used from existing pavers (A);	1		
		Boundary Protection – as existing re-used in situ (A);	1		
		Source MA			
		NB – Specific reference is made to the Green Guide to Housing Specification (2000 edition, BRE).			
Mat2	**Responsible Sourcing of Materials - Basic Building Elements:** To recognise and encourage the specification of responsibly sourced materials for key building elements.	Materials used in basic building elements are intended to be responsibly sourced (such as FSC, CSA, SFI, MTCC, PEFC, SGS, or TFT certification for timber and CERTIFIED EMS at process and extraction stage for other building materials). Source BU		6	6 = 2.71%
		For the purpose of this credit, the majority of materials in the following basic building elements are required to be responsibly sourced. 1. Frame 2. Ground floor 3. Upper floors (including any loft boarding) 4. Roof (structure and cladding) 5. External walls (including external cladding) 6. Internal walls (including internal partitions) 7. Foundation/substructure 8. Staircase (includes the tread, rises and stringers)			

ISSUE	COMMENT	DATA BASIS & SOURCES	SCORE (ECOPOINTS)	MAX SCORE & %
		The following materials are relevant for this credit 1. Brick 2. Composites 3. Concrete (including blocks, tiles etc.) 4. Glass 5. Plastics 6. Metals (steel, aluminium etc.) 7. Stone 8. Timber Note that insulation materials, fixings, adhesives, additives and other materials not listed above are also to be excluded from the assessment of this credit. NB- After construction, the developer or their agent must hold proof of the source of supply for five years, as BRE may audit this as part of the quality assurance system. BRE reserves the right to request to see the relevant documentation for certified or recycled timber.		
Mat3	**Responsible Sourcing of Materials - Finishing Elements:** To recognise and encourage the specification of responsibly sourced materials for secondary building and finishing elements.	Materials used in finishing elements are not intended to be responsibly sourced (such as FSC, CSA, SFI, MTCC, PEFC, SGS, or TFT certification for timber and CERTIFIED EMS at process and extraction stage for other building materials). Source XX. For the purpose of this credit, the majority of materials in the following secondary building and finishing elements are required to be responsibly sourced. 1. stair (including handrails, balustrades, banisters, other guarding/rails but excluding staircase) 2. window (including sub-frames, frames, boards, sills) 3. external & internal door: (including sub-frames, frames, linings, door) 4. skirting (including architrave, skirting board & rails) 5. panelling (including any other trim) 6. furniture (including fitted; kitchen, bedroom and bathroom) 7. facias (soffit boards, bargeboards, gutter boards, others) 8. any other significant use.	0	3 = 1.35%

ISSUE	COMMENT	DATA BASIS & SOURCES	SCORE (ECOPOINTS)	MAX SCORE & %
		The following materials are relevant for this credit 1. Brick 2. Composites 3. Concrete (including blocks, tiles etc.) 4. Glass 5. Plastics 6. Metals (steel, aluminium etc.) 7. Stone 8. Timber Note that insulation materials, fixings, adhesives, additives and other materials not listed above are also to be excluded from the assessment of this credit.		
		NB- After construction, the developer or their agent must hold proof of the source of supply for five years, as BRE may audit this as part of the quality assurance system. BRE reserves the right to request to see the relevant documentation for certified or recycled timber.		
Mat4	**Recycling Facilities:** To encourage developers to provide homeowners with the opportunity and facilities to recycle household waste.	**Internal storage** – Three internal recycling bins (in addition to the normal waste bins) will be provided with a minimum total capacity of 30 litres and no individual bin smaller than 7 litres. All bins should be in a dedicated position (e.g. kitchen cabinet or under the sink) and labelled for recycling.	6	6 = 2.71%
		NB - Where a local authority collects at least three types of recyclable waste in a single bin or sack, (i.e. for post collection sorting) it is necessary to provide only one internal bin for recyclables in order to gain the credits. In this case the single bin must have the same overall capacity as if three separate bins were provided, i.e.30 litres (in addition to the normal waste bins).		
		Local Authority Collection Scheme - Local Authority scheme will operate on this site for at least three types of recyclable waste. 6no credits are awarded. Source MA		
Water				
Wat1	**Internal Potable Water Use:** To reduce consumption of potable water in the home.	Currently not compliant due to limitations of re-use of rainwater on site. However, the internal water fixtures and fittings (namely the sanitary ware and brassware) will be specified for water efficiency.	0	5 = 8.33%

ISSUE	COMMENT	DATA BASIS & SOURCES	SCORE (ECOPOINTS)	MAX SCORE & %
Wat2	**External Potable Water Use:** To encourage the recycling of rainwater, and reduce the amount of water taken from the mains, for use in landscape/garden watering.	There will be provision for watering gardens and landscaping areas using a rainwater collection system (e.g. Below-ground store or water butts) in accordance with the Guidance criteria. Source BU + CB It is assumed that specific reference to the Guidance criteria will be made to ensure compliance with the following: <u>Size requirements for compliance</u> - Dwellings with only terraces and patios - a minimum of 100 litres - 1-2 bedroom dwellings with private garden - a minimum of 150 litres - 3+ bedroom dwellings with private garden - a minimum of 200 litres - Volume requirements can be halved when no planting is provided and the entire external space is covered by a hard surface - For communal gardens – a minimum of 1 litre capacity for each m^2 of land allocated to the dwelling (either uniquely allocated or shared with neighbouring dwellings), which is either planted or left as unplanted soil. A minimum of 200 litres needs to be provided even though no planting is provided and all surfaces are hard. NB - <u>The system should</u> - be connected to rainwater down pipes with auto-overflow to rainwater drainage systems. - have closed access at the top (such as removable lid) - have provision for a tap or similar and - have containers that are detachable from the system and with a removable element for cleaning	1	1 = 1.67%
Ecology				
Eco1	**Ecological Value of Site:** To encourage development on land that already has a limited value to wildlife and discourage the development of ecologically valuable sites.	Some of the pre-existing tree species on site have been removed for practical development reasons. The land is therefore classified as being of some ecological value and therefore this credit is not awarded. Source MM report 'rtmme121041'.	0	1 = 1.33%
Eco2	**Ecological Enhancement:** To enhance the ecological value of the site through advice from a registered consultant.	Advice was commissioned from a Suitably Qualified Ecologist (Middlemarch) to enhance the ecological value of the site. All Key recommendations and at least 30% of the Additional recommendations made by the ecologist will be implemented. Source MM report 'rtmme121041'.	1	1 = 1.33%

ISSUE	COMMENT	DATA BASIS & SOURCES	SCORE (ECOPOINTS)	MAX SCORE & %
Eco3	**Protection of Ecological Features:** To protect existing ecological features from substantial damage during the clearing of the site and the completion of construction works.	Existing ecological features (of significance) were not left untouched, therefore this credit is not gained. Source MM report 'rtmme121041'.	0	1 = 1.33%
Eco4	**Change of Ecological Value of Site:** To reward steps taken to minimise reductions in ecological value and to encourage an improvement.	The site will achieve a change in the ecological value of between +3 and +9 natural species per hectare, by following advice from a Suitably Qualified Ecologist (Middlemarch). 3 credits are therefore achieved. Source MM report 'rtmme121041'. It is possible that the current ambition of the Landscaping Plan may be further extended for one additional credit under this Issue and this is under discussion. NB- The change in the site's ecological value is calculated by comparing the estimated diversity of plant species before and after construction. In order to access this credit a survey of the site as existing and proposed (before clearance works) indicating the vegetation plot-types are required. **Additional credits may be achieved where a 'suitably qualified ecologist is appointed** and has been able to identify more specific habitat types and more accurate species number per habitat type for the development site.	3	4 = 5.33%
Eco5	**Building Footprint:** To promote the most efficient use of a building's footprint by ensuring that land and material use is optimised across the development.	Detailed calculations show that the total combined floor area to footprint ratio for all dwellings on site is greater than 3.5:1. Therefore two credits are awarded. Source: Drawings & calculations by MA 2/11/15.	2	2 = 2.67 %
Health and Well-being				
Hea1	**Daylighting:** To improve the quality of life in homes through good daylighting, and to reduce the need for energy to light a home.	This credit is not sought, although current design may comply with Daylight factors. AE can provide daylight calculations. Source AE	0	3 = 5.25%

ISSUE	COMMENT	DATA BASIS & SOURCES	SCORE (ECOPOINTS)	MAX SCORE & %
Hea2	**Sound Insulation:** To improve soundproofing for party walls and floors and reduce the likelihood of noise complaints.	EITHER written Building Control confirmation of 'no Part E requirements' will be obtained, OR suitable and compliant pre-completion acoustic Party Wall and Party Floor testing will be carried out as necessary, to achieve at least 5dB better than Bdg Regs. **Only sound insulation measurement <u>results</u> from UKAS or a European equivalent accredited consultants will be accepted. If the testing has been carried out/ will be carried out according to the relevant ISO requirement data have been/ will be checked and verified by an organisation with UKAS accreditation for field sound insulation testing.**	4	4 = 7.00%
Hea3	**Private Space:** To improve the occupiers' quality of life by providing an outdoor space for their use, which is at least partially private.	Private amenity space is currently unavailable in the form of external gardens (at least 1.5m2/ bedspace, minimum 3m2/home and accessible to relevant residents only). Source MA	0	1 = 1.75%
Management				
Man1	**Home User Guide:** To recognise and encourage the provision of guidance to enable home owners/occupiers to understand and operate their home efficiently, in line with current good practice, and to make best use of local facilities.	Each dwelling will be supplied with a simple guide that covers information relevant to the 'non-technical' residents on the operation and environmental performance of their home in accordance with the specific requirements stated in EcoHomes Guidance 2006. The user guide will include information relating to the environmental strategy and design features, energy use, details of renewable energy systems, water use, recycling and waste, sustainable DIY and emergency information. The guide will also cover information relating to the site and its surroundings. Source BB.	3	3 = 3.00%
Man2	**Considerate Constructors:** To recognise and encourage construction sites which are managed in an environmentally and socially considerate manner.	There is a commitment to comply with best practice site management principles and achieve formal certification under the Considerate Constructors Scheme including **Site Specific Certification**. Source BU There is a commitment to achieve formal certification under the Considerate Constructors **Specific Site** Registration Scheme (CCS) with a score of 35 or more, with a score of at least 7 in every section, including **Site Specific Certification**. Two credits are achieved. Source BU	2	2 = 2.00%

ISSUE	COMMENT	DATA BASIS & SOURCES	SCORE (ECOPOINTS)	MAX SCORE & %
Man3	**Construction Site Impacts:** To recognise and encourage construction sites managed in an environmentally sound manner in terms of resource use, energy consumption, waste management and pollution.	There is a commitment to monitor, sort and recycle construction waste on site. A site waste management policy will be drafted to monitor site construction waste. Source BU	3	3 = 3.00%
		In addition, 2 OR 4 or more of the items listed below will be achieved: a. monitor and report CO2 or energy arising from site activities; b. monitor and report CO2 or energy arising from transport to and from site; c. monitor and report on water consumption from site activities; d. adopt best practice policies in respect of air (dust) pollution arising from the site; e. adopt best practice policies in respect of water (ground and surface) pollution occurring on the site. f. 80% of site timber is reclaimed, reused or responsibly sourced.		
		NB- For waste management it will include targets for waste minimisation during the construction process. Where space on site is found to be too limited to allow waste materials to be segregated, a waste contractor will be used to separate and process recyclable materials off site. Site's construction waste will be sorted into at least five categories for recycling.		
		NB- Please note that EcoHomes does not require targets to be met but encourages the process of setting, monitoring and reporting against targets. With regard to waste recycling, sufficient documentary evidence must be produced at the Final assessment stage to demonstrate that segregation of materials is carried out to the correct standards and that materials are reused/ recycled as appropriate. The key waste groups include ceramics, inert materials such as clay, sand, gravel, natural stone etc., packaging materials, plastics, concrete, insulation, plaster/cement, timber, chemicals and oils, and architectural features.		
		NB-Where there is a commitment to monitor and report CO2 emissions/ energy consumption and water consumption from site activities, as a minimum monitoring shall include checking the meters and displaying some form of graphical analysis in the site office to show consumption over the project duration and how actual consumption compares to the targets set.		

ISSUE	COMMENT	DATA BASIS & SOURCES	SCORE (ECOPOINTS)	MAX SCORE & %
		NB- In addition, where best practice policies with respect to air (dust) pollution occurring on site are adopted, these will include 'dust sheets', regular proposals to damp down the site in dry weather and covers to skips. With regard to water (ground and surface) pollution procedures will follow best practice guidelines outlined in PPG1 (General guide to the prevention of pollution. Environment Agency), PPG 5 (Works in, near or liable to affect watercourses. Environment Agency) and PPG 6 (Working at demolition and construction sites. Environment Agency). Adequate procedures will be set in place to ensure that information pertaining to these policies is disseminated to site operatives. Note: DTI/BRE publications 'Control of Dust from Construction and Demolition Activities' and Pollution Control Guide Parts 1-5 provide good practice guidelines on construction related pollution.		
Man4	**Security:** To encourage the design of developments where people feel safe and secure.	There will be a commitment to work with an Architectural Liaison Officer and to achieve the Secured by Design award. ***Please note that for the Final assessment evidence will be required that an Architectural Liaison Officer (ALO) has been contacted at an early stage of the design, preferably before detailed planning, and that their advice has been followed.** Security standards for external doors and windows will not (due to Conservation reasons) achieve a minimum of either: · LPS1175 SR1 (All doors and windows) OR · PAS24-1 (All external pedestrian doorsets falling within scope of PAS24-1) AND BS7950 (All windows falling within the scope of BS7950). Therefore 2 credits in total are awarded. Source MA	1	2 = 2.00%
ESTIMATED TOTAL BEFORE 'WEIGHTING' FOR 'CATEGORY ISSUES' – SCORE OUT OF 107			**71**	
FINAL ESTIMATED TOTAL PERCENTAGE			**62.83**	
ESTIMATED ECOHOMES RATING			**VERY GOOD**	

ECOHOMES 2006

CURRENT RATING

Date 12/11/2015 **Project** PROJECT QUAD, NW1 4JL

EcoHomes Score	ISSUE CREDITS			CATEGORY WEIGHTING FACTOR	CREDITS SCORE
	CREDITS AVAILABLE	CREDITS ACHIEVED	PERCENT ACHIEVED		
ISSUE CATEGORY	a	b	b/a x 100 = c	d	c x d = e
ENERGY	24	18	75.00	0.22	17
TRANSPORT	8	8	100.00	0.08	8
POLLUTION	11	3	27.27	0.10	3
MATERIALS	31	22	70.97	0.14	10
WATER	6	1	16.67	0.10	2
LAND USE & ECOLOGY	9	6	66.67	0.12	8
HEALTH & WELL BEING	8	4	50.00	0.14	7
MANAGEMENT	10	9	90.00	0.10	9
TOTAL	107	71			**62.83**

CREDIT SCORE PER ISSUE							
Cat. / Issue	1	2	3	4	5	6	TOTAL
Energy	10	2	0	2	2	2	18
Transport	2	2	3	1			8
Pollution	1	0	0	0	2		3
Materials	10	6	0	6			22
Water	0	1					1
Ecology	0	1	0	3	2		6
Health	0	4	0				4
Management	3	2	3	1			9
TOTAL (UNWEIGHTED CREDITS)							71

EcoHomes Rating	SCORE	PRELIMINARY RATING
PASS	36	VERY GOOD
GOOD	48	
VERY GOOD	58	
EXCELLENT	70	

NB - ALL DATA IS 'ROUNDED'. FINAL SCORE IS JUDGED ONLY TO WHOLE NUMBER FULLY ACHIEVED (i.e. 99.99 is scored as 99, NOT 100)

PERCENTAGE POINTS PER SINGLE CREDIT POINT, BY ISSUE			
Ene	0.92	Wat	1.67
Tra	1.00	Eco	1.33
Pol	0.91	Hea	1.75
Mat	0.45	Man	1.00

CONCLUSION

EcoHomes assesses the environmental quality of a development by considering the broad concerns of climate change, use of resources, pollution, and impacts on bio-diversity. These concerns are balanced against the need for a high quality internal environment. The rating pass marks are 36% (Pass), 48% (Good), 58% (Very Good) and 70% (Excellent), but these can only be applied after all categories have been sub-totalled into their overall 'Issue' categories. At such time scores are 'weighted' and the final marks then calculated.

The Preliminary rating for this scheme is estimated as achieving the Target Rating but only if the issues awarded with credits are implemented in full.

The Project Team must check and confirm the data and assumptions contained within this report at the earliest opportunity. This will aid the timely and accurate submission of data for the Design Stage EcoHomes Assessment and set up an efficient path to the Post Construction Review.

The project team should ensure that the drawings and specifications follow AND clearly state ALL the relevant EcoHomes issues for each of the applicable credits. Please note that for the FINAL EcoHomes Assessment, without the evidence, the assessor cannot award the credits for such certificated assessment. Once the relevant EcoHomes issues are integrated in the design, ALL compliant data (auditable proof, as described in the EcoHomes Guidance) should then be submitted to the EcoHomes Assessor for the Final report to be made. Once this report is finished it can be submitted to the BRE for QA and Certification, as necessary.

REFERENCES

This report was based on the following drawings along with written, verbal and web-based evidence:

Drawing No. Reference		Status/Revision	Dated
Moxley Drawings		various	various

herrington
CONSULTING LIMITED

Flood Risk Assessment and Surface Water Run-off Calculations with the BREEAM New Construction 2011

Pol 03 Reduction of Surface Run-off and Pol 05 Flood Risk

6-10 Cambridge Terrace, London

November 2015

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Client: Project Quad Ltd

BREEAM: Ecohomes 2006 Assessment for 6-10 Cambridge Terrace, London

Pol 3 – Reduction of Surface Run-off
Pol 5 – Flood Risk

Contents Amendment Record

This report has been issued and amended as follows:

Issue	Revision	Description	Date
1	0	Draft report issued by email	05 November 2015

Herrington Consulting Limited
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Document Verification

Issue	Revision	Date:	05 November 2015	
1	0	Author(s):	Kirsty Thomas	Stephen Hayward
		First Check By:	Kirsty Thomas	
		Amendments Agreed:	Stephen Hayward	
		Second Check By:	Stephen Hayward	
		Amendments Agreed:	Kirsty Thomas	
		Director Sign Off:	Simon Maiden-Brooks	
Issue	**Revision**	**Date:**		
		Author(s):		
		First Check By:		
		Amendments Agreed:		
		Second Check By:		
		Amendments Agreed:		
		Director Sign Off:		

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Contents

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1 Background and Objectives

The following report has been prepared to meet the aims and objectives of the BREEAM: Ecohomes 2006 criteria for the Pol 3 – Reduction of Surface Run-off and Pol 5 – Flood Risk assessments.

The overall aims and objectives of both BREEAM guidance documents is to promote development in low flood risk areas, or to ensure that appropriate mitigation measures are taken to reduce the impact if flooding was to occur in areas with a medium or high risk of flooding. In addition, there is a requirement to reduce and delay the discharge of rainfall run-off to public sewers and watercourses. Furthermore, it is also necessary to minimise watercourse pollution and other environmental damage where possible.

The following assessment has been undertaken by Herrington Consulting Ltd to demonstrate that the requirements set out in the guidance document listed above has been met by the proposed development at **6-10 Cambridge Terrace, London, NW1 4JL.**

This assessment is not intended to be fully compliant with the National Planning Policy Framework (March 2012), although it has been carried out in accordance with good practice guidance as outlined in the NPPF and the accompanying Planning Practice Guidance Suite, (Formerly PPS25).

The location of the site is shown on the location plan in Figure 1.1 below.

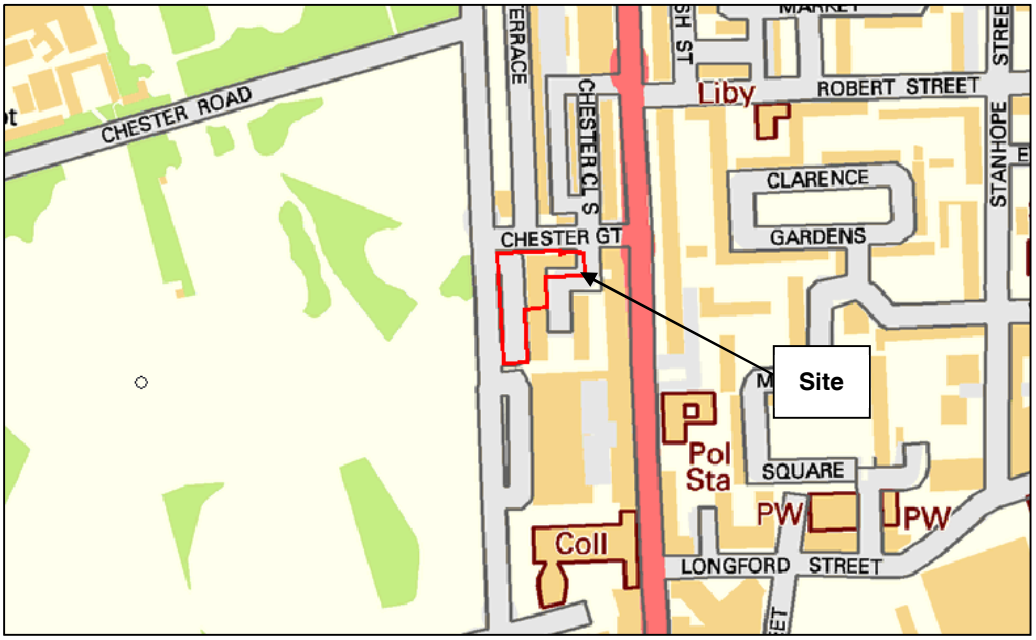

Figure 1.1 – Location plan (Contains Ordnance Survey data © Crown copyright and database right 2013)

1.1 *Development Proposals*

The development proposals for this site comprise the conversion of Grade I listed building, including the addition of new undercroft parking and leisure facilities.

The following sections outline the criteria for each assessment and appraise the number of credits achieved. The results of the Pol 05 – Flood Risk have been used to inform the Pol 03 – Reduction of Surface Run-off and consequently the following section appraises the risk of flooding to the development.

2 Pol 05 - Flood Risk

2.1 Available credits

Two credits

1. Where evidence provided demonstrates that the assessed development is located in a zone defined as having a low annual probability of flooding

One credit

2. Where evidence provided demonstrates that the assessed development is located in a zone defined as having a medium annual probability of flooding **AND**

3. The ground level of the building, car parking and access is above the design flood level for the site's location

2.2 Site-specific Flood Risk Assessment Objectives

The aims and objectives of a Flood Risk Assessment (FRA) are to promote development in areas at low risk of flooding, or to take measures to reduce the impact of flooding from new development in areas with a medium or high risk of flooding. The following Flood Risk Assessment has been undertaken by Herrington Consulting Ltd to demonstrate that the proposed development can meet the requirements set out in the BREEAM Pol 05 Flood Risk Criteria.

This assessment is not intended to be fully compliant with the National Planning Policy Framework (March 2012), although it has been carried out in accordance with good practice guidance as outlined in the NPPF and the accompanying Planning Practice Guidance Suite, (formerly PPS25).

2.3 Definition of Flood Hazards

For sites that are exposed to flood risk from the sea or from main rivers, the Environment Agency's flood zone maps are the first level of appraisal. These maps provide an overview of flood risk for England and categorise flood risk into three zones as follows:

Zone 1: Low annual probability of flooding

Zone 2: Medium annual probability of flooding

Zone 3: High annual probability of flooding

The Environment Agency flood zone map is shown for the area in which the subject site is located in Figure 2.1 below.

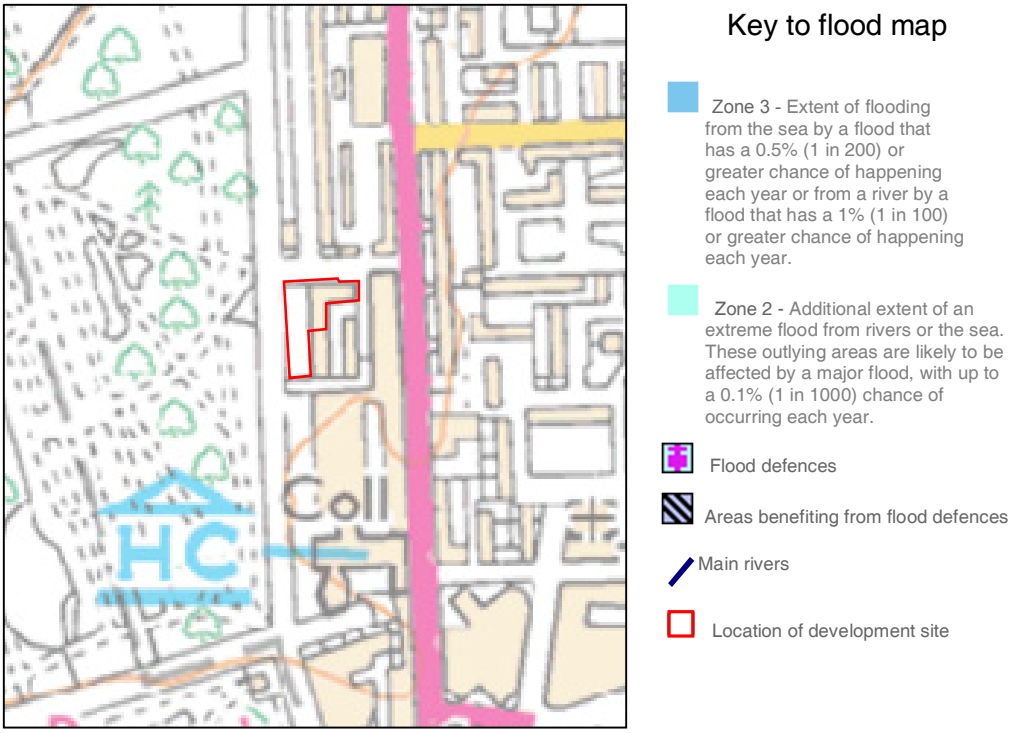

Figure 2.1 – Flood zone map showing the location of the development site (© Environment Agency)

The above mapping shows the development site to be located within Flood Zone 1 and not to be benefiting from existing flood defences that have been constructed in the last 5 years.

The risk of flooding from all key sources is considered in more detail below, including an allowance for climate change over the lifetime of the development. For a residential development this is considered to be 100 years, which is congruent with the design horizon for a residential building.

2.4 Potential Changes in Climate

When the impact of climate change is considered it is generally accepted that the standard of protection provided by current defences will reduce with time. The global climate is constantly changing, but it is widely recognised that we are now entering a period of accelerating change. Over the last few decades there have been numerous studies into the impact of potential changes in the future and there is now an increasing body of scientific evidence which supports the fact that the global climate is changing as a result of human activity. Past, present and future emissions of greenhouse gases are expected to cause significant global climate change during this century.

The nature of climate change at a regional level will vary: for the UK, projections of future climate change indicate that more frequent short-duration, high-intensity rainfall and more frequent periods of long-duration rainfall of the type responsible for the recent UK flooding could be expected.

Global sea levels will continue to rise, depending on greenhouse gas emissions and the sensitivity of the climate system. The relative sea level rise in England also depends on the local vertical movement of the land, which is generally falling in the south-east and rising in the north and west.

The National Planning Practice Guidance Suite to the NPPF provides allowances for the regional rates of relative sea level rise and these are shown in Table 2.1.

Administrative Region	Net Sea Level Rise (mm/yr) Relative to 1990			
	1990 to 2025	2025 to 2055	2055 to 2085	2085 to 2115
East of England, East Midlands, London, SE England (south of Flamborough Head)	4.0	8.5	12.0	15.0
South West	3.5	8.0	11.5	14.5
NW England, NE England (north of Flamborough Head)	2.5	7.0	10.0	13.0

Table 2.1 - Recommended contingency allowances for net sea level rise

The development site is not subject to coastal flooding and therefore these figures are included for background information purposes only.

The Technical Guidance also provides guidance on sensitivity allowances for other climatic changes such as increased rainfall intensity and peak river flows. These are shown in Table 2.2 below and where appropriate have been applied as part of this appraisal.

Parameter	1990 to 2025	2025 to 2055	2055 to 2085	2085 to 2115
Peak rainfall intensity	+5%	+10%	+20%	+30%
Peak river flow	+10%		+20%	
Offshore wind speed		+5%		+10%
Extreme wave height		+5%		+10%

Table 2.2 - Recommended national precautionary sensitivity ranges

The impact of climate change on the risk of flooding at the site and the way in which the development will affect flood risk elsewhere is considered further for each source of flooding detailed below.

2.5 Potential Sources of Flooding

Flooding from the Sea

The site is located a significant distance inland and is elevated at approximately 30m Above Ordinance Datum Newlyn (AODN), which is located a considerable height above the predicted extreme tide levels. Consequently the risk of flooding from this source is considered to be *negligible* and therefore the effects of flooding from the sea are not considered further in this appraisal.

Climate change

Sea levels are projected to rise by around 1m by the end of the century, however, given that the site is elevated significantly above this level, this increase will not be of direct concern. Consequently, the risk of flooding from the sea will remain *negligible*, even when the effects of climate change are considered.

Flooding from Main Rivers

The site is not within an area identified by the Environment Agency's flood maps as being at risk of flooding from main rivers (refer to Figure 2.1). The closest main river to the site is the River Thames, which is located approximately 2.6km to the southeast, and at least 20m below the site elevation. The site is not located within any defined fluvial flood zones and therefore it is considered that the risk of flooding from this source is *low*. Consequently, the risk of flooding from rivers is not considered further in this appraisal.

Climate change

Whilst an increase in peak flows in the river will result in an increase in flood depths and extents associated with the extreme event, the risk of flooding to the site will remain *negligible*. This is because the land levels at the site are significantly higher than the elevation of the River Thames, and this difference in height is far greater than any anticipated rise in flood levels which are likely to occur as a result of climate change.

Flooding from Non-main Rivers and other Watercourses

Inspection of the site and surrounding area reveals that there are no non-main rivers or artificial watercourses within close proximity of the site and therefore the risk of flooding from this source is considered to be negligible.

Pluvial flooding

Overland flooding typically occurs in natural valley bottoms as normally dry areas become covered in flowing water and in low spots where water may pond. This flooding mechanism can occur almost anywhere, but is likely to be of particular concern in any topographical low spot, or where the pathway for run-off is restricted by terrain or man-made obstructions. Consequently, the risk of overland flooding and flooding from surface water run-off has been assessed in more detail.

However, the prediction of flooding from surface water can be difficult, as it is hard to forecast the exact intensity and extent of rainfall of a storm. Under the Flood Risk Regulations 2009, the Environment Agency was required to produce and publish flood maps for surface water.

Maps showing the risk of flooding, and the associated approximate depth and velocity have been produced using information from Lead Local Flood Authorities, such as drainage rates, percentage run-off rates and critical storm durations. The maps pick out natural drainage channels, rivers, low areas within the floodplain and flow paths between buildings. In addition, the maps also consider the influence of buildings, roads and other structures within the floodplain which could obstruct flows, and account for a reduction in rainfall due to drains, sewers and infiltration. They do not,

however, take into account individual property threshold heights and assume a single drainage rate for all urban areas.

Consequently, the surface water maps and the associated information are intended for guidance only, and cannot provide details for individual properties. They do, however, provide high level information and indicate areas in which surface water flooding issues should be investigated further. The risk categories are classified as follows:

- *Very low probability of flooding* – This zone is assessed as having less than a 1 in 1000 annual probability of surface water flooding.

- *Low probability of flooding* – This zone comprises land assessed as having between a 1 in 100 and 1 in 1000 annual probability of surface water flooding.

- *Medium probability of flooding* - This zone comprises land assessed as having between a 1 in 30 and 1 in 100 annual probability of surface water flooding.

- *High probability of flooding* – This zone is assessed as having greater than a 1 in 30 annual probability of surface water flooding.

Figure 2.2 below is an extract of the Environment Agency's 'Risk of Flooding from Surface Water' map and identifies the location of the site. This map has been interrogated to assist in this review, helping to identify whether the site is located in an area at specific risk of surface water flooding.

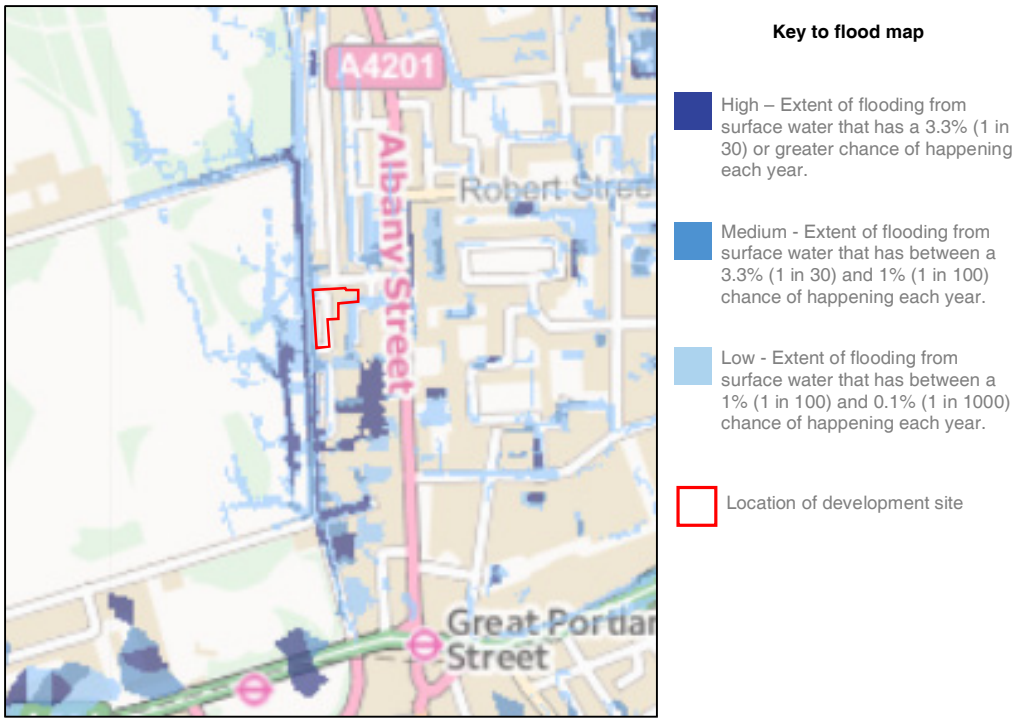

Figure 2.2 – Surface water flooding map showing the location of the development site (© Environment Agency)

The above mapping shows the development site is located in an area identified as having a 'very low' risk of flooding from surface water. However, it can be seen that the highways surrounding the site are identified as having a 'low' to 'high' risk of flooding from this source. Further interrogation of this mapping provides estimates of predicted flood depths over a range of return periods. This reveals that for flood events up to and including the 1 in 1000 year event, flood depths within the highway (Outer Circle) are predicted to be less than 300mm.

Inspection of OS mapping shows that land levels in the highway fall towards the south, and the gradient becomes significantly shallower at the site location. The flow path identified by the EA mapping therefore represents shallow sheet flow within the highway. Given that the land levels continue to fall away from the site to the south, and that there are no topographic low points or obstructions that would otherwise encourage water to pond, the risk of flooding to the site from surface water is considered to be *low*.

Climate change

Climate change will result in an increase in the volume of floodwater during a surface water flood event. However, as the site is not located in a topographic depression the risk of flooding from surface water is not likely to increase when the effects of climate change are taken into consideration. The risk will therefore remain *low.*

Flooding from groundwater

Water levels below the ground rise during wet winter months, and fall again in the summer as water flows out into rivers. In very wet winters, rising water levels may lead to the flooding of normally dry land, as well as reactivating flow in 'bournes' (streams that only flow for part of the year). Where land that is prone to groundwater flooding has been built on, the effect of a flood can be very costly, and because groundwater responds slowly compared with rivers, floods can last for weeks or months. Groundwater flooding generally occurs in rural areas, although it can also occur in more urbanised areas where a process known as "groundwater rebound" can cause localised flooding of basements. This increase in the water table level occurs as a result of the decrease in groundwater extraction that has taken place since the decline in urban aquifer exploitation by heavy industry.

Data on groundwater flooding has been compiled by the British Geological Society and is illustrated on a series of maps, which are the product of integrating several datasets, including: a digital model of the land surface, digital geological map data and a water level surface based on measurements of groundwater level made during a particularly wet winter. This dataset provides an indication of areas where groundwater flooding may occur, but is primarily focussed on groundwater flooding potential over the Chalk of southern Britain (as Chalk shows some of the largest seasonal variations in groundwater level, and is thus particularly prone to groundwater flooding incidents).

Inspection of the groundwater flood risk map data shows that the general area in which the development site is located is identified as being at low risk from groundwater flooding. The more detailed mapping on groundwater emergence provided as part of the Defra Groundwater Flood Scoping Study (May 2004), which delineates areas where groundwater flooding has occurred in the past and also areas that are potentially vulnerable to groundwater emergence, has also been

referenced as part of this report. This shows that no groundwater flooding events were recorded during the very wet periods of 2000/01 or 2002/03 and that the site itself is not located within an area where groundwater emergence is predicted.

Furthermore, the UK hydrogeological maps, compiled by the BGS reveal that the underlying bedrock (London Clay) contains essentially no groundwater as the clay is up to 140m thick, thereby confining any underlying aquifers. In addition, the maps included in the SFRA for Camden Borough Council do not show the site to be located in an area which is prone to groundwater flooding. Consequently, the risk of groundwater emergence at the site is considered to be *low*.

Climate change
Inspection of the topography and nature of the site and surrounding area suggests that even when the impact of climate change is considered, the risk of groundwater emergence will remain *low*.

Flooding from sewers
In urban areas, rainwater is frequently drained into surface water sewers or sewers containing both surface and wastewater known as “combined sewers”. Flooding can result when the sewer is overwhelmed by heavy rainfall, becomes blocked or is of inadequate capacity, and will continue until the water drains away. When this happens to combined sewers, there is a high risk of land and property flooding with water contaminated with raw sewage as well as pollution of rivers due to discharge from combined sewer overflows.

The SFRA prepared by the London Borough of Camden reveals that there has been no sewer flooding incidents in this area in recent years. In addition, the topography of the land within the site and the surrounding area suggests that any above ground flooding that might occur as a result of a surcharged sewer would not pond at the site. The risk of flooding from this source is therefore considered to be low.

Climate change
Given the topography and nature of the site, the risk of flooding from sewers remains unchanged when the effects of climate change are taken into account.

Flooding from reservoirs, canals and other artificial sources
Non-natural or artificial sources of flooding can include reservoirs, canals and lakes where water is retained above natural ground level, operational and redundant industrial processes including mining, quarrying and sand and gravel extraction, as they may increase floodwater depths and velocities in adjacent areas. The potential effects of flood risk management infrastructure and other structures also need to be considered. Reservoir or canal flooding may occur as a result of the facility being overwhelmed and/or as a result of dam or bank failure. Also, any man-made drainage system such as a drain, sewer or ditch could potentially cause flooding.

Inspection of the Ordnance Survey mapping for the area shows that there are no artificial sources of flooding within close proximity to the site. In addition, the Environment Agency’s ‘Risk of Flooding

from Reservoirs' website shows that the site is not within an area considered to be at risk of flooding from reservoirs (Figure 2.3).

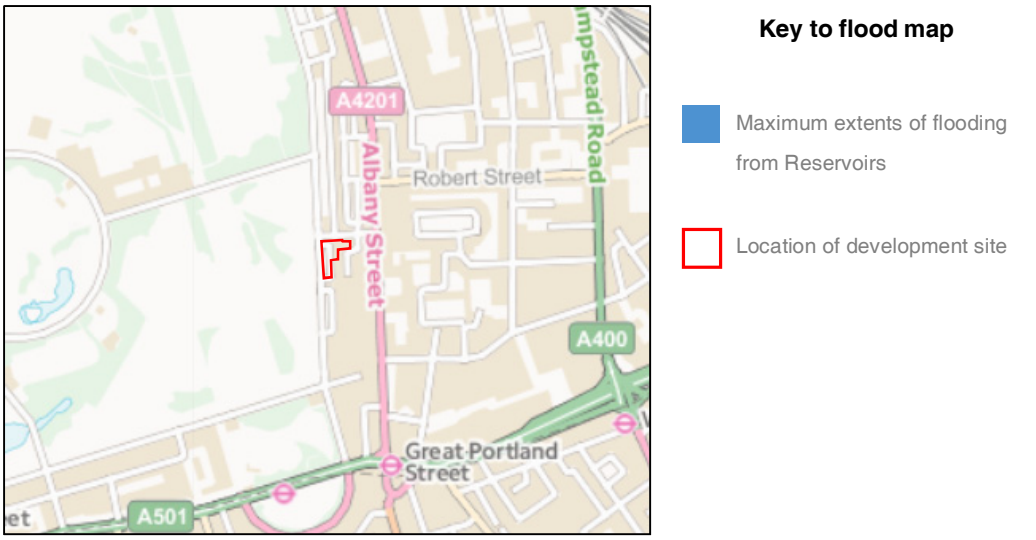

Figure 2.3 – Risk of Flooding from Reservoirs map showing the location of the development site (© Environment Agency)

A summary of the overall risk of flooding is provided in Section 2.7.

2.6 Residual risk

When considering residual risk it is necessary to make predictions as to the impacts of a flood event that exceeds the design event, or in the case of areas that are already defended to an adequate standard, the impact of a failure of these defences.

The previous assessment demonstrates that the site is in a location that is not exposed to any significant risks of flooding. When an exceedance event is considered, the well elevated location of the site and the significant distance from any of the key sources of flooding indicates that the site will remain within a *low* flood risk category.

Notwithstanding this, it is also necessary to take into consideration climatic changes and residual risk events, i.e. an event that exceeds the design event conditions over the lifetime of the development. Whilst the impact of neither of these events has been assessed in detail at this stage, it is evident that the levels are unlikely to increase with climate change to a level which could have a negative impact on the site. Consequently, the proposed development is likely to remain unaffected.

2.7 Summary & Conclusions

A summary of flood risk is given in Table 2.3 below.

Source of flooding	Initial Level of risk	Appraisal method applied at the initial flood risk assessment stage
Rivers (main)	Low	Environment Agency flood zone maps
Non main rivers and watercourses	Low	Site based appraisal and historical evidence
Sea/Estuaries	Low	Environment Agency flood zone maps
Overland flow	Low	OS mapping, Environment Agency 'flooding from surface water' maps, site based appraisal and historical evidence
Groundwater	Low	BGS groundwater flood hazard maps, Defra Groundwater Flood Scoping Study, historic records contained within the SFRA and site specific geological data
Sewers	Low	Historic records contained within the SFRA and site based appraisal
Artificial sources	Low	OS mapping and Environment Agency 'risk of flooding from reservoirs' maps

Table 2.3 – Summary of flood sources and risks

In order to meet the assessment criteria of BREEAM: Ecohomes Pol 05 it is necessary to provide evidence demonstrating that the assessed development is located in a zone defined as having a low annual probability of flooding.

This site-specific FRA has therefore considered a range of potential mechanisms in which flooding could occur and has appraised the risk from each source at a site specific level. The subject site, 6-10 Cambridge Terrace, London is situated within Flood Zone 1 (low risk) and it has been demonstrated that the risk of flooding from all key sources is low.

It is therefore possible to conclude that **two credits can be awarded under the Pol 05 – Flood Risk criteria.**

3 Pol 03 – Reduction of Surface Run-off

3.1 Description of available credits

The following credit requirements apply to both new build and refurbishment, and apply to **all** dwellings throughout the development.

Where rainwater holding facilities and/or sustainable drainage techniques are used to provide attenuation of water run-off to either natural watercourses and/or municipal drainage systems, achieve attenuation by 50%* in areas of low probability of flooding, 75%* in areas of medium flood risk and 100%* in areas of high flood risk, at peak times from:

- Hard Surfaces (**one credit**)
- Roofs (**one credit**)

**where a statutory body requires greater attenuation then the higher requirements should be met in order to achieve these credits.*

From the previous assessment in section 2, it can be seen that the site at 6-10 Cambridge Terrace, London is located in an area with a low probability of flooding. Consequently, a 50% reduction in the rate of run-off discharged from roof and hardstanding surface would be required in order to obtain both credits.

There have been no additional requirements or planning conditions for restricting the discharge of surface water run-off from the proposed development and consequently, in this instance only the 50% reduction criterion applies.

3.2 Site Characteristics

The following information and data has been used in appraising the surface water management requirements for the proposed development. The relevant characteristics of the pre and post-developed site are set out in Table 3.1

Site Characteristic	Pre-developed site	Post-developed site
Total area of site	Approximately 2220m^2	
Area of hard surfaces	824m^2	849m^2
Roof area	718m^2	718m^2
Infiltration rate	not tested (assumed poor)	
Greenfield run-off rate	3.7l/s/ha	
Standard Percentage Run-off (SPR)	50.5%	
SAAR	642mm	
Is the site within a Source Protection Zone	No	

Table 3.1 – Pre and post development site characteristics affecting rainfall run-off

3.3 Geology and Soils

The site geology has been ascertained from the British Geological Survey geological mapping. Soils information has been obtained from the National Soil Resources Institute. The geology and soil characteristics are described as follows:

Bedrock (solid) geological deposits – London Clay Formation – clay, silt and sand

Superficial (drift) geological deposits – None

Soils in this area are described as 'Slowly permeable seasonally wet slightly acid but base-rich loamy and clayey soils'

3.4 Contamination

This site is a brownfield and is presumed to be free from contamination. Consequently the use of infiltration is not restricted on this basis.

3.5 Existing Drainage

Inspection of the topographic survey undertaken for the site (by others) reveals that a large part of the existing roof area currently discharges surface water run-off into the public sewer system.

3.6 Attenuation of Run-off from Hard Surfaces (one credit)

To achieve the credit for attenuating run-off from hard surfaces a 50% reduction in the rate of run-off leaving the site from hardstanding surfaces must be attained. In this case the proposed development does not incorporate any attenuation for run-off from hard surfaces. Consequently, the credit for attenuating surface water run-off from all hardstanding cannot be awarded.

3.7 Attenuation of Run-off from Roofs (one credit)

To achieve the credit for attenuating run-off from roof areas a 50% reduction in the rate of run-off leaving the site from roof areas must be attained. In this case whilst the proposed development does include a 5000l rainwater harvesting tank, this in isolation is not sufficient to reduce run-off rates discharged from the roof to the public sewer by 50%. Consequently, the credit for attenuating surface water run-off from the roofs cannot be awarded.

4 Summary

The following table summarises the results of this BREEAM: Ecohomes Pol 03 – Reduction of Surface Run-off and Pol 05 – Flood Risk appraisals. This shows that the elements of the proposed scheme which meet the criteria of the BREEAM: Ecohomes 2006.

Element	Available Credits	Criteria achieved?	Points awarded
Flood risk	2	Yes	**2**
Reduction of Surface Run-off	2	No	0

From the table above it can be seen that the proposed development achieves the criteria for 2 of the 4 available credits for Pol 05 - Flood Risk and Pol 03 –Reduction of Surface Run-off.

There are no mandatory elements required as part of the flood risk or surface water run-off elements of the EcoHomes and therefore, this report concludes that **the proposed development can be awarded a total of 2 credits.**

A Appendices

Consultants Details

Parameter	Values
Company Name	Herrington Consulting Ltd
Company Address	Unit 6 – Barham Business Park Elham Valley Road Canterbury CT4 6DQ
Engineer	Simon Maiden-Brooks
Qualifications	BSc (Hons) MSc CEng CWEM MCIWEM
Value of Consultants PI Cover	£2m

6-10 CAMBRIDGE TERRACE, LONDON

ECOHOMES 2006 ECOLOGICAL ASSESSMENT

A Report to: CPC London Ltd

Report No: RT-MME-121041

Date: October 2015

MIDDLEMARCH ENVIRONMENTAL

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REPORT VERIFICATION AND DECLARATION OF COMPLIANCE

This study has been undertaken in accordance with British Standard 42020:2013 “Biodiversity, Code of practice for planning and development”.

Report Version	Date	Completed by:	Checked by:	Approved by:
Final	03/01/2012	Paul Roebuck MSc MCIEEM (Senior Ecological Consultant) Joscelin Moran BSc (Hons) BREEAM Project Manager	Dr Katy Read MCIEEM CEnv (Executive Director)	David Smith MCIEEM (Ecology and Landscape Director)

The information which we have prepared is true, and has been prepared and provided in accordance with the Chartered Institute of Ecology and Environmental Management’s Code of Professional Conduct. We confirm that the opinions expressed are our true and professional bona fide opinions.

DISCLAIMER

The contents of this report are the responsibility of Middlemarch Environmental Ltd. It should be noted that, whilst every effort is made to meet the client’s brief, no site investigation can ensure complete assessment or prediction of the natural environment.

Middlemarch Environmental Ltd accepts no responsibility or liability for any use that is made of this document other than by the client for the purposes for which it was originally commissioned and prepared.

VALIDITY OF DATA

The findings of this study are valid for a period of 24 months from the date of survey. If works have not commenced by this date, an updated site visit should be carried out by a suitably qualified ecologist to assess any changes in the habitats present on site, and to inform a review of the conclusions and recommendations made.

NON-TECHNICAL SUMMARY

- CPC London Ltd are involved in the extension (including excavation of new basement level) and refurbishment of the existing residential dwellings at 6-10 Cambridge Terrace in London.

- At the time of the survey, the site clearance works had commenced including clearance of the garden (shrubs and trees) and excavation of the basement. The site consisted of the existing residential dwellings with areas of hardstanding.

- We recommend that a total of **5 credits** for ecology can currently be awarded. If the client provides written confirmation that the recommendations in this report are carried out a further **2 credits** may be awarded:

    - Eco 1: We recommend **0 credits** may be awarded as the site did not meet with the criteria for land of low ecological value.

    - Eco 2: We recommend **0 credits** may be awarded at present; however **1 credit** is available subject to the site enhancement recommendations in Section 5.2 being observed.

    - Eco 3: We recommend **0 credits** may be awarded as features of ecological value have been removed from site to facilitate the development.

    - Eco 4: We recommend **3 credits** of the 4 available credits may be awarded at present but a further **1 credit** may be available on receipt of a planting scheme.

    - Eco 5: We recommend **2 credits** may be awarded as the dwelling has a footprint: floor area ratio greater than 3.5:1.

CONTENTS

1. INTRODUCTION

CPC London Ltd commissioned Middlemarch Environmental Ltd to conduct an ecological assessment at 6-10 Cambridge Terrace, London. The ecological assessment was performed to comply with the format of EcoHomes 2006.

The ecological assessment aims to identify the important ecological features of the site and details measures that should be taken to protect and enhance them. It also appraises the ecological diversity of the site before and after development.

This report is divided into five chapters:

- Chapter 1 provides an explanation of the EcoHomes concept.
- Chapter 2 provides a brief introduction to the development.
- Chapter 3 describes the methodology used in the ecological assessment.
- Chapter 4 provides a description of the site and the current ecological value of the site.
- Chapter 5 details the ecological credits.

1.1 ECOHOMES 2006 – THE ENVIRONMENTAL RATING FOR HOMES

1.1.1 EcoHomes 2006 – The Environmental Rating for Homes assesses the environmental impact of new home schemes. It aims to provide guidance on ways of minimising the adverse effects of new home buildings on the global and local environments, whilst promoting healthy internal conditions.

1.1.2 The basis of the scheme is a certificate awarded to individual buildings on the basis of points for a set of performance criteria determined by the Government in close working consultation with the Building Research Establishment (BRE). The certificate enables the owners to gain recognition for building environmental performance. Trained personnel, appointed by BRE, assess the building and it's environment. The number of credits attained is interpreted in the form of an overall rating of *Excellent, Very Good, Good or Pass*. Some credits are optional.

1.1.3 The performance criteria are grouped under the following categories: energy, water, pollution, materials, transport, land use and ecology and health and well being. Some categories are optional.

1.1.4 The aim is to reduce the ecological impact of the development project, such as by minimising the loss of important wildlife habitats, and maximising the wildlife potential of the site by the enhancement and creation of new habitats and their subsequent sympathetic management.

1.2 ECOLOGICAL CREDITS

1.2.1 There are nine ecological credits available, these are as follows:

a) <u>Ecological Credit: Eco 1</u>
1 credit for building on land of *low ecological value* by either:
- Building on land which meets defined criteria checklist for low ecological value; or
- Where land is ecologically valuable, designing within recommendations following an audit by the AWTC (Association of Wildlife Trust Consultancies – The Wildlife Trusts Partnership) or another qualified organisation recognised and audited by a recognised authority.

b) <u>Ecological Credit: Eco 2</u>
1 credit for designing-in features for positive *enhancement of the site ecology* in accordance with advice from the AWTC.

c) <u>Ecological Credit: Eco 3</u>
1 credit for the *protection of existing features* of ecological value.

d) Ecological Credit: Eco 4

- 1 credit for a change of ecological value of between –9 and –3 natural species hectares;
- 2 credits for a change of ecological value of between –3 and +3 natural species hectares;
- 3 credits for a change of ecological value of between +3 and +9 natural species hectares;
- 4 credits for a change of ecological value of greater than +9 natural species hectares.

e) Ecological Credit: Eco 5

- 1 credit for a mixed development where the combined floor area: footprint ratio for ALL houses on site is greater than 2.5 AND the combined floor area: footprint ratio for ALL flats on site is greater than 3.5.
- 2 credits for a development where the combined floor area: footprint ratio of ALL dwellings on site is greater than 3.5.

2. PROJECT INTRODUCTION

CPC London Ltd are involved in the extension (including excavation of new basement level) and refurbishment of the existing residential dwellings at 6-10 Cambridge Terrace in London.

3. METHODOLOGY

This chapter details the methodology used by the AWTC to carry out an EcoHomes 2006 Ecological Assessment.

3.1 ECOHOMES 2006 ECOLOGICAL ASSESSMENT

The assessment methodology consists of:

- A site survey
- An assessment of the sites ecological value
- A set of recommendations for the protection and enhancement of the site
- An appraisal of landscape proposals and other documents

Whilst every effort is made to notify the client of any plant species listed on Schedule 9 of the Wildlife and Countryside Act (1981, as amended) present on site, it should be noted that this is not a specific survey for these species.

3.2 SITE SURVEY

A full site survey was conducted on the 20th October 2015 by Paul Roebuck, Senior Ecological Consultant. This included an assessment of the habitat types, floral and faunal species and any features of ecological value. Please see Appendix 1 for ecologist qualifications.

Middlemarch Environmental Ltd had previously completed an Extended Phase 1 Habitat Survey of the gardens at the site (Report Number RT-MME-105012, May 2009). The data from the report has been utilised in this assessment of ecology credits.

3.3 DOCUMENTATION PROVIDED

The documentation provided by the client and used in completion of this assessment report is outlined in Table 3.1.

Document Name/Drawing Number	Author
Site Location Plan: 639-1.001	Moxley Architects Ltd
Sub-basement Plan: QUA-MOX-2000 Rev E	Moxley Architects Ltd
Basement Plan: QUA-MOX-2002 Rev E	Moxley Architects Ltd
Lower Ground Floor Plan: QUA-MOX-2003 Rev E	Moxley Architects Ltd
Ground Floor Plan: QUA-MOX-2004 Rev E	Moxley Architects Ltd
First Floor Plan: QUA-MOX-2005 Rev E	Moxley Architects Ltd
Second Floor Plan: QUA-MOX-2006 Rev E	Moxley Architects Ltd
Third Floor Plan: QUA-MOX-2007 Rev E	Moxley Architects Ltd
Fourth Floor Plan: QUA-MOX-2008 Rev E	Moxley Architects Ltd
Roof Plan: QUA-MOX-2009 Rev E	Moxley Architects Ltd
Stage D Landscape Report: 622_01(RP)002	Robert Myers Associates

Table 3.1: Documentation Provided by the Client

4. CURRENT ECOLOGICAL VALUE

4.1 SITE LOCATION

The residential development is located in the London Borough of Camden at National Grid Reference TQ 287 825.

4.2 EXISTING SITE

The development site measures approximately 0.18 ha and is located within a residential area immediately adjacent to The Regents Park. At the time of the survey, the site clearance works had commenced including clearance of the garden (shrubs and trees) and excavation of the basement. The site consisted of the existing residential dwellings with areas of disturbed ground and hardstanding.

Prior to clearance works there was a managed garden at the frontage of the properties. This comprised a formal shrub bed with scattered trees. The species recorded are listed in Table 4.1.

English Name	Scientific Name
Introduced shrubs	
Daffodil	*Narcissus* sp.
Holly	*Ilex aquilfolium*
Mahonia	*Mahonia* sp.
Pieris	*Pieris* sp.
Purple iris	*Iris* sp.
Rose	*Rosa* sp.
Skimmia	*Skimmia japonica*
Spotted laurel	*Acuba japonica*
Scattered trees	
Holly	*Ilex aquilfolium*
Lime	*Tilia* sp.
Plum	*Prunus domestica*
Sycamore	*Acer campestre*

Table 4.1: Floral Species Recorded during the 2009 Survey

4.3 HABITATS

Prior to development the site comprised the following habitats (listed in alphabetical order not that of ecological importance).

Building and hardstanding
The site was dominated by seven existing terraced mansions with associated hardstanding access roads to the front and rear. This habitat is deemed to have low ecological value.

Introduced shrub
A linear formal shrub bed was located at the front of the properties. This habitat provides foraging opportunities for wildlife (such as invertebrates and birds), however can be easily recreated post development. This habitat is therefore deemed to have low ecological value.

Scattered trees
A number of early-mature to mature trees were located within the formal shrub bed along the western perimeter of the site. These trees did not have features suitable for use by roosting bats, however provide potential foraging habitat for bat species as well as nesting habitat for birds. This habitat may be deemed to have moderate ecological value due to the maturity of the trees.

5. ECOLOGICAL CREDITS

5.1 ECO 1: ECOLOGICAL VALUE OF THE SITE

1 credit is available for *building on land of low ecological value.*

The site did not meet with the defined criteria of land of low ecological value due to the presence of early-mature to mature scattered trees. The trees have been removed to facilitate the development. We therefore recommend that **0 credits** may be awarded.

5.2 ECO 2: ECOLOGICAL ENHANCEMENT OF THE SITE

There is **1 credit** available for designing-in features for positive *enhancement of the site ecology.*

We recommend that this credit should be awarded if the following criteria are undertaken. Section 5.2.1 contains the key recommendations, which must all be adopted and Section 5.2.2 contains additional recommendations, of which over 30 % must be adopted.

5.2.1 KEY RECOMMENDATIONS

Good Horticultural Practice
It is important to implement good horticultural practice in any landscaping scheme, including the use of peat-free composts, mulches and soil conditioners. The use of pesticides (herbicides, insecticides, fungicides and slug pellets *etc*) should be discouraged to prevent cumulative fatal effects to animals via the food chain, particularly invertebrates, birds and/or mammals. Any pesticides used should be non-residual.

Tree Planting
Plant at least six new trees on site, which must be native or wildlife attracting species (Appendix 2).

The Stage D Landscape Report indicates that this criterion is to be met.

Shrub Planting
At least 60 m^2 of shrubs must be planted in the garden area; these must be native species or species attractive to wildlife (Appendix 2).

The Stage D Landscape Report indicates that this criterion is to be met.

5.2.2 ADDITIONAL RECOMMENDATIONS

Bulb Planting
At least 20 m^2 of bulbs should be planted in the garden, suitable species include:
Snowdrop *Galanthus nivalis*
Bluebell *Hyacinthoides non-scripta*
Wild Daffodil *Narcissus pseudonarcissus*
Winter Aconite *Eranthis hyemalis*
Ramsons *Allium ursinum*
Round Headed Leek *Allium sphaerocephalon*
Lesser Celandine *Ranunculus ficaria*
Angular Solomons Seal *Polygonatum odoratum*
Wood Anemone *Anemone nemorosa*
Lily of the Valley *Convallaria majalis*

The Stage D Landscape Report indicates that this criterion is to be met.

Bird Boxes
At least two bird boxes should be erected on site; these may include open-fronted, terraced, or hole-entrance nesting boxes (see Appendix 3 for further details).

Bat Boxes
At least two bat boxes or bricks should be installed on site. The bat boxes can either be attached to the buildings or to suitable existing trees (Appendix 3). In general, bats seek warm places and for this reason boxes should be located where they will receive full/partial sun. Although, installing boxes in a variety of orientations will provide a range of climatic conditions. Position boxes at least 3m above ground to prevent disturbance from people and/or predators.

Log Pile
Create a log pile in the garden to provide a habitat for invertebrates, including stag beetles. Use wood from broadleaved trees, particularly oak, beech or fruiting trees with bark still attached. Partially bury these vertically in the soil in the shade and allow plants to grow over these to retain the moisture.

Planting for Bees
Bees rely on an adequate supply of food throughout the year. Planting should consist of plants which flower from early March to October (as shown in Table 5.2). The plants should be rich in pollen and nectar (avoid over cultivated varieties).

Winter / Spring Flowering	Early Summer Flowering	Late Summer Flowering
Winter heather *Erica carnea*	Foxglove *Digitalis purpurea*	Lavender *Lavandula* sp.
Pussy willow *Salix caprea*	Geranium *Geranium* sp.	Marjoram *Origanum majorana*
Comfrey *Symphytum officinale*	Thyme *Thymus vulgaris*	Scabious *Scabiosa* sp.
Pieris *Pieris* sp.	Allium *Allium* spp.	Verbena *Verbena bonariensis*
Rosemary *Rosmarinus officinalis*	Columbine *Aquilegia* sp.	Viper's bugloss *Echium vulgare*
Flowering currant *Ribes sanguineum*	Monkshood *Aconitum napellus*	Honeysuckle *Lonicera periclymenum*
Blackthorn *Prunus spinosa*	Oxeye daisy *Leucanthemum vulgare*	Borage *Borago officinalis*
Red campion *Silene dioica*	Cowslip *Primula veris*	Open-flowered dahlia *Dahlia* sp.
Crab apple *Malus sylvestris*	Everlasting sweet pea *Lathyrus latifolius*	Ivy *Hedera helix*
Flowering cherry *Prunus* sp.	Stachys *Stachys* sp.	Oregon-grape *Mahonia*
Viburnum *Viburnum tinus*	Columbine *Aquilegia* sp.	Cornflower *Centaurea cyanus*
Hawthorn *Crataegus monogyna*	Teasel *Dipsacus fullonum*	Wallflower *Erysimum* 'Bowles's Mauve'

Table 5.2: Planting Suitable for Bee-friendly Garden

5.3 ECO 3: PROTECTION OF ECOLOGICAL FEATURES

1 credit is available for the *protection of existing features during site preparation and construction works.*

The site contained several early-mature to mature scattered trees (features of significant ecological value); these have been removed to facilitate the development. We therefore recommend that **0 credits** may be awarded.

5.4 ECO 4: CHANGE IN ECOLOGICAL VALUE OF THE SITE

There are **4 credits** available for *minimising reductions and improving the ecological value of the site.*

Tables 5.2 and 5.3 provide the calculations to assess the species change post development based on current client information.

The species diversity prior to the commencement of development was calculated and the results are given in Table 5.2.

Plot Type	Area of Plot Type (m²)		Species (No.)		Species x Area of Plot Type
Building and hardstanding	1,675	X	0	=	0
Introduced shrub	120	X	8 (Actual)	=	960
Scattered trees	30	X	4 (Actual)	=	120
Total (1)	**1,825**			**Total (2)**	**1,080**
Total species x area of plot type/Total site area = (2)/(1) =					**0.59**

Table 5.2: Pre-development Ecological Value

The post-development score can be calculated using current client information, as shown in Table 5.3.

Plot Type	Area of Plot Type (m²)		Species (No.)		Species x Area of Plot Type
Building and hardstanding	1,542	X	0	=	0
Retained tree	3	X	1 (Actual)	=	3
Wildlife planting	280	X	36 (Actual)	=	10,080
Total (1)	**1,825**			**Total (2)**	**10,083**
Total species x area of plot type/Total site area = (2)/(1) =					**5.52**

Table 5.3: Post-development Ecological Value

There is a gain of 4.93 species and therefore we recommend **3 credits** out of an available 4 credits may be awarded for the current planting schedule. Table 5.4 details the number of additional plant species required as part of a wildlife planting scheme to earn the further **1 credit** available for this section.

Number of Credits	Change in Ecological Value Required	Ecological Value Required	Number of Additional Plant Species Required *
4	9+	9.59	27

Table 5.4: Ecological Value and Number of Plant Species Required for Further Credit

* The calculation is based on 280 m² of wildlife planting as indicated on the proposed landscaping plans. Please note that only native or wildlife attracting species count towards the totals.

5.5 ECO 5: DEVELOPMENT FOOTPRINT

There are **2 credits** available for ensuring *land and material use is optimised for each dwelling on the development*.

- 1 credit for a development where the combined floor area/footprint ratio of ALL the houses on site is greater than 2.5:1 and the combined floor area/footprint ratio of ALL the flats on site is greater than 3.5:1.
- 2 credits for a development where the combined floor area/footprint ratio of ALL dwellings on site is greater than 3.5:1.

The information provided by the client demonstrates that the new residential development will have a floor area/footprint ratio greater than 3.5:1 (eight-storey house extended by sub-basement level to fourth floor). We therefore recommend that **2 credits** may be awarded.

APPENDICES

APPENDIX 1:

ECOLOGIST QUALIFICATIONS

Ecologist Details

Name: Paul Roebuck – Senior Ecological Consultant
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Ecology Report Reference: RT-MME-121041

Qualifications in ecology or related subject:

MSc Freshwater & Coastal Sciences
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Memberships:

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Relevant Experience:

Paul's expertise includes the provision of green infrastructure and ecological enhancement recommendations with respect to construction and the built environment. An experienced ecologist with over 8 year's relevant employment, 3 of which are within the last 5 years. Well practiced at working in both multi-disciplinary environmental and ecological consultancy teams delivering a wide range of biodiversity services including management of large scale infrastructure projects.

APPENDIX 2:
LIST OF WILDLIFE ATTRACTING PLANTS

Species	Height/Spread	Colours	Flowers/Berries	Wildlife benefits	Plant conditions and notes	Deciduous or Evergreen
Native Trees						
Field Maple *Acer campestre*	To 25m	Leaves: Green then amber in Autumn. Flowers: Yellow/green. Seeds: Green then brown with wings.	Flowers May to June	51 species of insects/mites and 24 species of lepidoptera. Fruits eaten by small mammals.	Calcareous or clay soils preferably in full sun.	Deciduous
Alder *Alnus glutinosa*	6-15m	Leaves: Green, Catkins: Yellow/brown, Fruits: Cone-like, small and brown.	Catkins in March to April	141 species of insects/mites and 71 species of lepidoptera. Seeds are good for birds such as siskins.	Damp soil. Plant hardwood cuttings in the open in late autumn.	Deciduous
Silver Birch *Betula pendula*	To 18m	Leaves: Green turning yellow in Autumn, Catkins: Yellow/brown then seeding, Bark: White.	Catkins open in April and break up in winter releasing it's seeds.	Excellent for insects and to attract inset eating birds. Best tree for moth larvae. Catkins good food source for birds such as redpolls and tits.	Dry acid best.	Deciduous
Downey Birch *Betula pubescens*	To 24m	Leaves: Green turning yellow in Autumn, Catkins: Yellow/brown then seeding, Bark: White.	Catkins open in April and break up in winter releasing it's seeds.	Excellent for insects and to attract inset eating birds. Catkins good food source for birds.	Favours wetter more peaty soil.	Deciduous

Hornbeam *Carpinus betulus*	To 24m	Leaves: Green, Catkins: Green/crimson then seeding.	Flowers in May	51 species of insects/mites and 32 species of lepidoptera. Seeds for birds. Can provide dense nesting cover.	Woods and copses on clay soils, will tolerate shade. Sow seeds or fruits in spring.	Deciduous
Hazel *Corylus avellana*	To 10m	Leaves: Green, Flowers: Long Yellow/Crimson tassels. Seeds: Brown nuts.	Flowers in February	106 species of insects/mites and 68 species of lepidoptera. Nuts eaten by birds and mammals i.e. squirrels, mice and jays.	Hedgerows, scrub and woodland in well-drained soil. Full sun or light shade preferable. Remove and plant rooted suckers or offsets in autumn.	Deciduous
Beech *Fagus sylvatica*	To 46m	Leaves: Green then orange to red/brown in Autumn, Flowers: Green/white. Seeds: Brown nuts encased in a brown husk.	Flowers March to April.	98 species of insects/mites and 51 species of lepidoptera. The masts are eaten by birds and mammals including wood mice and Jays.	Well-drained soils. Can survive in shallow soil. Sow seeds or fruits in autumn.	Deciduous. Can hold dead leaves through the winter.
Ash *Fraxinus excelsior*	To 37m	Leaves: Green, Flowers: Green/Purple prior to the leaves. Seeds: Green single seeds in bunches with a long wing.	Flowers: April-May	68 species of insects/mites and 32 species of lepidoptera. Seeds eaten by birds and mammals.	Will survive on most soils with reasonable light. Sow seeds or fruits in autumn.	Deciduous
Juniper *Juniperus communis*	Shrub or tree to 7m	Leaves: Spiky Green needles, Flowers: Small green to yellow flowers, Berries: Green ripening to purple in the second year.	Flowers May to June. Berries take two years to ripen.	32 species of insects/mites and 14 species of lepidoptera.	Well-drained limestone and acid sandstone.	Evergreen

Crab Apple *Malus sylvestris*	To 10m	Leaves: Green, Flowers: White and pink. Fruits: Green/yellow/red apples.	Flowers: April to May. Fruits ripen in Autumn.	118 species of insects/mites and 76 species of lepidoptera. Fruits are eagerly consumed by birds and mammals despite its bitter taste.	Well-drained soil in full sun.	Deciduous
Scots Pine *Pinus sylvestris*	To 36m	Leaves: Green needles, Flowers: Yellow and crimson, Cones: Short and brown.		172 species of insects/mites and 36 species of lepidoptera. Cones are a valuable food source for birds and other mammals.	Prefers sandy well-drained soil in full sun.	Evergreen
Black Poplar *Populus nigra*	33m	Leaves: Green turning yellow in Autumn, Flowers: Green and crimson catkins, turning fluffy when fruiting.	Catkins produced in March.	153 species of insects/mites and 69 species of lepidoptera found within all the poplar species. Good for larger moth species i.e. Hawk moths	Fertile soil near water. Remove and plant rooted suckers or offsets in autumn. Reduced in numbers due to easy hybridisation with other poplars	Deciduous
Aspen *Populus tremula*	To 24m	Leaves: Green turning yellow in Autumn, Flowers: Green and brown catkins, turning fluffy when fruiting.	Catkins arrive in March and set seed in May.	Good for invertebrates and birds. Food plant of the hairstreak butterfly.	Will survive on most soils with full sun or partial shade.	Deciduous
Wild Cherry *Prunus avium*	9-12m	Leaves: Green turning crimson in Autumn, Flowers: White, Berries: Bright red.	Flowers: April, Berries: July	Birds feed on the cherries.	Prefers fertile soil, will tolerate some shade.	Deciduous
Bird Cherry *Prunus padus*	Shrub or tree to 19m	Leaves: Green, Flowers: White, Berries: Black cherries.	Flowers in May.	9 species of lepidoptera. Berries eaten by birds	Woods and scrub. Well-drained soil with full sun or light shading.	Deciduous

Oaks (native) *Quercus spp.*	To 42m	Leaves: Green, Flowers: Slim yellow catkins, Seeds: Green acorns turning brown when ready to fall.	Flowers in May. Acorns produced in Autumn.	423 species of insects/mites and 193 species of lepidoptera. Acorns eaten by a variety of birds and mammals. Very important for insect eating birds.	Variety of soils with reasonable depth and preferably in full sun, below 300m altitude. Sow seeds or fruits in autumn.	Deciduous
Willows *Salix spp.*	To 25m (species dependent)		Flowers February to March.	450 species of insects/mites and 166 species of lepidoptera.	Damp areas. Plant hardwood cuttings in the open in late autumn.	Deciduous
Goat Willow aka 'pussy willow' *Salix caprea*	Shrubby tree to 10m	Leaves: Oval, dark grey/green on top with a hairy underside, Flowers; Green and yellow short catkins turning fluffy when seeding.	Flowers March to April	Early provider of pollen and nectar for insects.	Most soils as long as they are at least slightly damp.	Deciduous
Grey Willow *Salix cinerea*	Shrubby tree to 6m	Leaves: Grey/green on top with a lighter hairy underside, Flowers; Yellow catkins turning fluffy when seeding.	Flowers March to April	Good for insects and birds.	Most soils as long as they are at least slightly damp.	Deciduous
Crack Willow *Salix fragilis*	Can reach 25m	Leaves: Long, shiny green on top with a grey/green underside, Flowers; Green and yellow catkins turning fluffy when seeding.	Flowers in April with the catkins appearing in May and ripening in the summer.	Good for insects and birds.	Most soils as long as they are at least slightly damp.	Deciduous
Bay Willow *Salix pentandra*	To 10m	Leaves: Long, shiny green on top with a grey/green underside, Flowers: Yellowish catkins,fluffy when seeding.	Flowers May to June	Good for insects and birds.	Wet ground by water.	Deciduous

Elderberry *Sambucus nigra*	To 10m	Leaves: Green, Flowers: Small creamy white flowers in large numbers. Berries: Dark purple/black in bunches.	Flowers May to June	Berries for birds and nectar for insects.	Sun or partial shade.	Deciduous
Whitebeam *Sorbus aria*	10 to 24m	Leaves: Green with white hairy underside turning yellow/crimson in Autumn, Flowers: White, Berries: Green ripening to bright red.	Flowers: May	Flowers attract insects and the fruits are eaten by birds.	Prefers calcareous soil.	Deciduous
Rowan *Sorbus aucuparia*	18m	Leaves: Pinnate green leaves turning crimson in Autumn, Flowers: Small white flowers in clusters, Berries: Bright red.	Flowers in May. Produces berries in autumn.	58 species of insects/mites and 28 species of lepidoptera. The ripe berries attract birds such as redwings and field-fares.	Will tolerate most soils apart from very heavy soils.	Deciduous
Wild Service Tree *Sorbus torminalis*	To 20m	Leaves: Shiny green with a lighter coloured underside, turning purple/red in Autumn, Flowers: Creamy white in clusters, Seeds: Brown speckled seeds in clusters.	Flowers: May or June Fruit: September	Good for insects. Fruits eaten by birds	Withstands shade. Prefers clay and limestone soil.	Deciduous
Lime *Tilia europaea*	To 46m	Leaves: Green heart-shaped with slightly hairy underside, Flowers: Greenish/ yellow flowers, Seeds: Small round and hairy with a grey-brown colour.	Flowers June to July.	57 species of insects/mites and 31 species of lepidoptera. The nectar is highly sought by bees.	Needs well-drained soil with full or partial sun.	Deciduous

Wych Elm *Ulmus glabra*	To 37m	Leaves: Green turning yellow in autumn , Flowers: very small purplish flowers, Seeds: Circular winged fruits with the seed in the centre.	Flowers produced in spring prior to the leaves, with winged fruits produced in July.	Good tree for insects and birds.	Full sun or light shade on most soils especially limestone. This species is less suseptable to Dutch elm disease.	Deciduous
Dutch Elm *Ulmus hollandica*	To 32m	Leaves: Green, Seeds: Circular winged fruits with the seed in the centre.	Winged fruits produced in July.	Good tree for insects and birds.	A native tree which has occurred naturally as a hybridisation between two other elms. Full sun or light shade. This species is less suseptable to Dutch elm disease.	Deciduous
English Elm *Ulmus procera*	To 33m	Leaves: Green, Flowers: Small crimson flowers, Seeds: Circular winged fruits with the seed in the centre.	Crimson flowers produced in spring with winged fruits produced in July.	124 species of insects/mites and 24 species of lepidoptera are associated with elm trees.	Full sun or light shade. 1 in 5 trees have caught Dutch elm disease which the English elms are suseptable to.	Deciduous

Species	Height/Spread	Colours	Flowers/Berries	Wildlife benefits	Plant conditions and notes	Deciduous or Evergreen
Introduced Trees						
Sweet Chestnut *Castanea sativa*	To 35m	Leaves: Green, Flowers: Long yellow tassels. Seeds: Brown nuts encased in a green spiky husk.	Flowers July. Seeds produced in autumn decreasing in size the further north the plants are situated.	11 species of insects/mites and 1 species of lepidoptera. Seeds eaten by a variety of mammals.	Well-drained soil, in full or partial sun. Sow seeds or fruit in spring.	Deciduous
European Larch *Larix decidua.*	To 46m	Leaves: light green needles, Flowers Yellow/dull-red small globes, Cones: Light brown	Spring	38 species of insects/mites and 15 species of lepidoptera. Cones provide food for tits and finches.	Likes plenty of space in full sun.	Deciduous
Magnolia *Magnolia*				Early source of nectar for insects		
Apple *Malus domestica*	To 11m	Leaves: Green, Flowers: Deep pink. Fruits: Reddish-purple.	Flowers: April to May. Fruits ripen in Autumn.	Good for invertebrates. Fruits are eagerly consumed by birds and mammals.	Well-drained soil in full sun.	Deciduous
Purple Crab *Malus purpurea*	To 10m	Leaves: Green, Flowers: White and pink. Fruits: Green/yellow/red apples.	Flowers: April to May. Fruits ripen in Autumn.	Good for invertebrates. Fruits are eagerly consumed by birds and mammals.	Well-drained soil in full sun.	Deciduous

Norway Spruce *Picea abies*	To 46m	Leaves: Green needles, Flowers: Yellow and pink, Cones: Long and brown.	Flowers open in May. Cones ripen in autumn.	70 species of insects/mites and 13 species of lepidoptera. The cones are eaten by birds and mammals which include crossbills, treecreepers and red squirrels.	Any reasonable soil, preferably in good sun.	Evergreen
White Poplar *Populus alba*	24m	Leaves: Dark green upper with pale hairy underside, Flowers: Green catkins, turning fluffy when fruiting.	Catkins produced in March.	Good for invertebrates and birds especially larger moth species.	Full sun or partial shade. Remove and plant rooted suckers or offsets in autumn. Can tolerate pollution well, but the roots can damage pipelines and paving.	Deciduous
Wild Plum *Prunus domestica*	To 8m	Leaves: Green, Flowers: White, Fruits: Small purple plums.	Flowers: March to May. Fruits ripen in Autumn.	Nectar and fruits for invertebrates. Fruits are eagerly consumed by birds and mammals.	Well-drained soil in full sun.	Deciduous
Peach *Prunus persica*	6m	Leaves: Dark green, Flowers: Deep pink, Fruits: Usual peach.	Flowers: April to May. Fruits ripen in Autumn.	Nectar and fruits for invertebrates. Fruits are eagerly consumed by birds and mammals.	Well-drained soil in full sun.	Deciduous
Pear *Pyrus communis*	To 15m	Leaves: Dark glossy green, Flowers: White, Fruits Yellow-green to brown.	Flowers: April to May. Fruits ripen in Autumn.	Good for invertebrates. Fruits are eagerly consumed by birds and mammals.	Well-drained soil in full sun.	Deciduous
Wild Pear *Pyrus pyraster*	To 15m	Leaves: Dark glossy green, Flowers: White, Fruits Yellow-red to brown, 1-4cm. The tree/shrub is usually spiny.	Flowers: April to May. Fruits ripen in Autumn.	Good for invertebrates. Fruits are eagerly consumed by birds and mammals.	Well-drained soil in full sun.	Deciduous

Native Shrubs						
Box *Buxus sempervirens*	To 3m	Leaves: Small, dark green and glossy, Flowers: Small green/yellow, Seeds: Black encased in blue green capsules turning brown in September	Flowers April to May	Provides good nesting cover and winter roosting cover for birds.	Calcareous soils in full sun or partial shade.	Evergreen
Heather *Calluna vulgaris*	50-100cm	Leaves: Green and minute, Flowers: Pink/purple, Seeds: Very small replacing flowers.	Flowers in July to November	Good for invertebrates with a late supply of nectar	Well-drained acid soil in full sun.	Evergreen
Dogwood *Cornus sanguinea*	To 4m	Leaves: Green and hairy turning crimson an Autumn, Flowers: Greenish white in groups, Berries: Black in clusters.	Flowers in June. Produces bitter black berries in August-September.	17 species of lepidoptera. Larval food plant of the green hairstreak butterfly. Flowers produce an unpleasant smell which is attractive to insects. Some birds manage to eat the berries.	Woods and scrub on limestone or base rich clays.	Deciduous
Hawthorn *Crataegus monogyna*	6m	Leaves: Small and green, Flowers: Bright yellow, Seeds: In green pods.	Flowers: White – mid May. Berries: Red/orange in Autumn	Nectar. Berries good food source for thrushes, redwings and fieldfares. Good nesting if dense. Excellent for moth larvae.	Any soil.	Deciduous
Broom *Cytisus scoparius*	2.5m	Leaves: Small green and deeply lobed, Flowers: White, Berries: Red.	Yellow flowers April-June	Good for 39 species of lepidoptera. Food plant of the hairstreak butterfly.	Calcifuge, heathland, sandy banks, open woodland and rough ground. Well drained soil in full sun. Plant semi-ripe cuttings in a cold frame in summer.	Semi-evergreen

Spurge Laurel *Daphne laureola*	1m	Leaves: Light green, Flowers: White/green, Berries: Black.	Flowers in February to April	Early source of nectar for insects. Berries for birds which are poisonous to man.	Well-drained humus-rich or chalky soil in full sun or deep shade.	Evergreen
Mezereon *Daphne mezereum*	1m	Leaves: Light green with cream tinged edges, Flowers: Bright pink, Berries: Red.	Flowers in February to April	Early source of nectar for insects.	Well-drained humus-rich soil in full sun or light shade.	Deciduous
Heath 'Bell' *Erica cinerea*	To 50cm	Leaves: Green and minute, Flowers: Pink/purple, Seeds: Very small replacing flowers.	Flowers July to August.	Provides nectar for invertebrates.	Well-drained acid soil in full sun.	Evergreen
Heath 'Cross-leaved' *Erica tetralix*	To 50cm	Leaves: Green and minute, Flowers: Pink/purple, Seeds: Very small replacing flowers.	Flowers July to August.	Provides nectar for invertebrates.	Damp acid soil in full sun	Evergreen
Spindle *Euonymus europaeus*	5m (8m max)	Leaves: Light green turning to crimson in Autumn, Flowers: Greenish yellow, Seeds: encased in a four lobed pink capsule.	Fruit October to December.	10 species of lepidoptera. Nectar is good for insects. Berries are good for birds but induce vomiting in people.	Woods, hedgerows and scrub on calcareous or base rich clays. Plant semi-ripe cuttings in a cold frame in summer	Deciduous
Alder Buckthorn *Frangula alnus*	2.5m	Leaves: Shiny green, Flowers: very small greenish flowers, Berries: Green berries turning red then purple.	Flowers: Early summer. Berries: Autumn	Berries for birds. Important food plant for brimstone butterfly larvae.	Damp acidic soil/peat	Deciduous
Tutsan *Hypericum androsaemum*	80cm	Leaves: Green turning red in autumn, Flowers: Yellow, Berries: Black	Flowers June to October followed by berries.	Flowers attract insects especially bees. Berries are eaten by birds and small mammals.	Full sun or light shade in damp soil. Plant semi-ripe cuttings in a cold frame in summer.	Deciduous

Holly *Ilex aquifolium*	300 x 150+ cm	Leaves: spiky glossy green, Flowers: Small pink/white, Berries: Bright red.	Flowers: May. Berries: (only on female trees) October to December.	Berries good for birds and small mammals. Caterpillars of the holly blue butterfly feed on the leaves. Holly leaf miner provides winter food for birds.	Not wet. Layer stems in spring. Need male and female plants near each other to produce berries.	Evergreen
Privet *Ligustrum vulgare*	3m	Leaves: Green, Flowers: White, Berries: Small black berries	Flowers: July.	24 species of insects/mites, nectar for the butterflies. Berries eaten by birds.	Hedgerows and scrub, especially on base rich soil. Plant hardwood cuttings in the open in late autumn.	Deciduous or semi-evergreen in mild areas.
Shrubby Cinquefoil *Potentilla fruticosa.*	1m	Leaves: Green, Flowers: Yellow.	Flowers May to September.	Nectar source for bees and butterflies	Well-drained soil in full sun or light shade. Semi-ripe cuttings in a cold frame in summer.	Deciduous
Blackthorn *Prunus spinosa*	4m	Leaves: Green, Flowers: White, Berries: Blue/black.	Flowers: spring.	Good for nesting birds if grown as thicket or in hedge. Rich in insects. Fruit for birds. Black hairstreak butterfly lays its eggs mainly on blackthorn.	Well-drained soil preferably in a sunny location.	Deciduous
Buckthorn *Rhamnus catharticus*	5m	Leaves: Yellow green, Flowers: Yellow/green, Berries: Black. Stems with spines.	Flowers: May to June	Larval food plant for brimstone butterfly.	Damp, peat or base-rich soils.	Deciduous
Dog Rose *Rosa canina*	3-4m	Leaves: Green , Flowers: Pink/white, Hips: Red.	Flowers: June to July. Hips: autumn	Provides nectar for bees and butterflies. Hips good for small birds and mammals.	Dislikes wet or exposed sites Can tolerate poor fertility.	Deciduous
Sweet Briar *Rosa rubiginosa*	240 x 240cm	Leaves: Green , Flowers: Pink, Hips: Red/orange.	Flowers: mid summer. Berries: autumn	Hips food source for small mammals and birds. Good nesting cover.	Prefers sun and well drained soil.	Deciduous

Raspberry *Rubus idaeus*	1.5-2.5m	Leaves: Green with thorns on underside, Flowers White, Berries: Red, Stems also have thorns.	Flowers May to August with berries following.	Nectar source for bees and butterflies. Berries for birds and mammals.	Any reasonable soil in full sun or partial shade.	Deciduous shrub
Gorse *Ulex europaeus*	2-2.5m	Leaves: Thin and spiky, green in colour, Flowers: Yellow.	Autumn flowers, can flower throughout the year.	29 species of insect. Provides good protection for birds nests frequently used by linnets, whinchats and stonechats.	Sandy or peaty well-drained soil in full sun. Grassland, heathland and open woods. Plant semi-ripe cuttings in a cold frame in summer.	Evergreen
Wayfaring Tree *Vibernum lantana*	3m	Leaves: Green, Flowers: Whitish yellow, Berries: Red then becoming black.	Flowers in June to July.	Berries for birds and nectar for insects.	Most soils especially base rich.	Deciduous
Guelder Rose *Viburnum opulus*	300 x 250cm	Leaves: Green, Flowers: White, Berries: Bright red.	Flowers: May to June. Berries: autumn	Nectar for insects, particularly hoverflies. Fruits for birds and small mammals, especially liked by woodmouse. Note: leaves, bark and berries are all poisonous.	Plant semi-ripe cuttings in a cold frame in summer.	Deciduous
Introduced Shrubs						
Juneberry *Amelanchier lamarkii*	To 6m	Leaves: Pink when unfolding, turning green then yellow-brown in Autumn, Flowers: White in large quantities, Berries: Round red fruits turning purple when ripe.	Flowers April to May with berries in the summer.	Nectar source for bees and butterflies. Berries for birds.	Full sun or partial shade on light acid soils.	Deciduous

Spotted Laurel *Aucuba japonica*	2-3m	Leaves: Dark green with yellow speckles, leathery in texture, Flowers: Small and white, Berries: Green, ripening to red the following spring	Berries: October-January	Berries for birds.	Sun or deep shade, all soils.	Evergreen
Darwin's Barberry *Berberis darwinii*	To 3m	Leaves: Sharp holly-like green leaves, Flowers: Orange in small clusters, Berries: Blue berries in bunches, Stems: with spines.	Flowers in spring. Berries in autumn.	Berries for birds and nectar for insects. Can provide good nesting cover for small passerines.	Sun or light shade. Various propagation methods. Note: this shrub is a winter host for wheat rust - agricultural fungal pest.	Evergreen
Hooker's Barberry *Berberis hookeri*	To 3m	Leaves: Sharp green leaves, Flowers: Yellow in small clusters, Berries: Black berries in bunches, Stems: with spines.	Flowers in spring. Berries in autumn.	Berries for birds and nectar for insects. Can provide good nesting cover for small passerines.	Sun or light shade. Various propagation methods. Note: this shrub is a winter host for wheat rust - agricultural fungal pest.	Evergreen
Hedge Barberry *Berberis stenophylla*	To 3m	Leaves: Small sharp green leaves, Flowers: Yellow in small clusters, Berries: Blue/black berries in bunches, Stems: with spines.	Flowers in spring. Berries in autumn.	Berries for birds and nectar for insects. Can provide good nesting cover for small passerines.	Sun or light shade. Various propagation methods. Note: this shrub is a winter host for wheat rust - agricultural fungal pest.	Evergreen
Thunberg's Barberry	To 1.5m	Leaves: Bright red in Autumn, Flowers: Yellow in small clusters, Berries: Red berries in bunches, Stems: with spines.	Flowers in spring. Berries in autumn.	Berries for birds and nectar for insects. Can provide good nesting cover for small passerines.	Sun or light shade. Various propagation methods. Note: this shrub is a winter host for wheat rust - agricultural fungal pest.	Deciduous

Thunberg's Barberry *Berberis thunbergii 'Atropurpurea'*	To 2m	Leaves: Bronze leaves bright red in Autumn, Flowers: Yellow in small clusters, Berries: Red berries in bunches, Stems: with spines.	Flowers in spring. Berries in autumn.	Berries for birds and nectar for insects. Can provide good nesting cover for small passerines.	Sun or light shade. Various propagation methods. Note: this shrub is a winter host for wheat rust - agricultural fungal pest.	Deciduous
Thunberg's Barberry *Berberis thunbergii 'Atropurpurea Nana'*	60cm	Leaves: Bronze leaves bright red in Autumn, Flowers: Yellow in small clusters, Berries: Red berries in bunches, Stems: Almost spineless.	Flowers in spring. Berries in autumn.	Berries for birds and nectar for insects. Can provide good nesting cover for small passerines.	Sun or light shade. Various propagation methods. Note: this shrub is a winter host for wheat rust - agricultural fungal pest.	Deciduous
Barberry *Berberis vulgaris*	To 3m	Leaves: Green leaves, Flowers: Yellow in small clusters, Berries: Red berries in bunches, Stems: with spines.	Flowers in spring. Berries in autumn.	Berries for birds and nectar for insects. Can provide good nesting cover for small passerines.	Sun or light shade. Various propagation methods. Note: this shrub is a winter host for wheat rust - agricultural fungal pest.	Deciduous
Alternate-Leaved Butterfly-Bush *Buddleia davidii*	Willow like shrub to 8m	Leaves: Green , Flowers: Lilac found on long drooping stems covered in globular shaped flower bunches, Seeds: Found in the flower heads which stay on the plant for most of the winter.	Flowers July to September	Nectar for bees and butterflies. The best bush available for butterflies especially if planted in a sun trap.	Dryish soil in full sun or partial shade. Plant semi-ripe cuttings in a cold frame in summer or plant hardwood cuttings in the open in late autumn.	Deciduous

Buddleia (butterfly-bush) *Buddleia davidii*	300 x 180cm	Leaves: Dark green above with a lighter hairier underside, Flowers: Long spikes with a lavender colour, Seeds: Found in the flower heads which stay on the plant for most of the winter.	Flowers July to September	Nectar for bees and butterflies. The best bush available for butterflies especially if planted in a sun trap.	Dryish soil in full sun or partial shade. Plant semi-ripe cuttings in a cold frame in summer or plant hardwood cuttings in the open in late autumn.	Deciduous
Orange Ball Tree *Buddleia globosa*	To 5m	Leaves: Dark green above with a lighter hairier underside, Flowers: Orange in a globular shape, Seeds: Found in the flower heads which stay on the plant for most of the winter.	Flowers May to June	Nectar for bees and butterflies.	Dryish soil.	Deciduous to semi-evergreen
Weyer's Butterfly-Bush *Buddleia weyeriana*	300 x 180cm	Leaves: Green, Flowers: Yellow found on inflorescence which is interrupted with spaces slightly globular in shape, Seeds: Found in the flower heads which stay on the plant for most of the winter.	Flowers May to June	Nectar for bees and butterflies. Flowers slightly later then *davidii* attracting the butterflies from these bushes.	Dryish soil in full sun or partial shade. Plant semi-ripe cuttings in a cold frame in summer or plant hardwood cuttings in the open in late autumn.	Deciduous to semi-evergreen
Blue Spiraea *Caryopteris clandonensis*	1m	Leaves: Blue/green, Flowers: Blue in clusters.	Flowers, September to October.	Provides a late source of pollen and nectar.	Requires well-drained soil in full sun.	Deciduous
Californian Lilac *Ceanothus 'Autumnal Blue'*	1.8 x 1.8+m	Leaves: Green and shiny, Flowers: Purple in clusters.	Flowers in July to October.	Nectar for bees and butterflies.	Fertile soil in a sunny location.	Evergreen

Californian Lilac *Ceanothus 'Gloire de Versailles'*	1.8 x 1.8m	Leaves: Dark green and shiny, Flowers: Light blue in clusters.	Flowers in July to October.	Nectar for bees and butterflies.	Fertile soil in a sunny location.	Deciduous
Japanese Quince *Chaenomeles japonica*	1m	Leaves: Green , Flowers: Red, Fruits: Large, golden brown.	Flowers March-May followed by fruits which ripen in October.	Berries for birds and mammals.	Full sun	Deciduous
Quince variety *Chaenomeles speciosa*	Bush to 1.5m or train as a Climber to 3m x 30cm thick	Leaves: Green sparser then *japonica* , Flowers: depends on variety, Fruits: Large, golden brown.	Flowers March-May and the fruits ripen in October.	Nectar source for bees and butterflies. Berries for birds and mammals. Good for birds to nest in as branches are sturdy with spines to deter cats.	Sun or shade.	Deciduous
Smoke Bush *Cotinus coggygria*	3m	Leaves: Green turning orange or red in autumn, Flowers: Light pink feathery flowers.	Flowers June - July	Good for bees and birds	Sandy infertile soil best, full sun preferred.	Deciduous
Cotoneaster 'Coral Beauty' *Cotoneaster conspicuous 'Decorus'*	Spreading shrub To 1.5m	Leaves: Small green, Berries: Red.	Berries October to January.	Berries good for birds and small mammals. Nectar for invertebrates.	Any reasonable soil, preferably in good sun. Plant semi-ripe cuttings in a cold frame in summer.	Evergreen
Francchet's Cotoneaster *Cotoneaster franchetii*	To 3m	Leaves: Small green and glossy with silvery hairy underneath, Flowers: Light Purple, Berries: Orange.	Berries October to January.	Berries good for birds and small mammals. Nectar for invertebrates.	Any reasonable soil, preferably in good sun. Plant semi-ripe cuttings in a cold frame in summer.	Semi-evergreen

Cotoneaster *Cotoneaster frigidus*	To 8m	Leaves: Small green and glossy, Flowers: White, Berries: Red.	Berries October to January.	Berries good for birds and small mammals. Attracts waxwings and pheasants.	Plant semi-ripe cuttings in a cold frame in summer.	Deciduous to semi-evergreen
Daphne *Daphne odora*	1m	Leaves: Dark green, Flowers: Bright pink.	Flowers in February to April	Early source of nectar for insects.	Well-drained humus-rich soil in full sun or light shade.	Evergreen
Broad-leaved Oleaster *Elaeagnus macrophylla*	To 3m	Leaves: Silvery when unfolding turning dark glossy green, Flowers: Creamy yellow bell shaped, Berries: Red	Flowers in October to November.	Provides a late source of pollen and nectar.	Any reasonable soil, preferably in good sun.	Evergreen
Spreading Oleaster *Elaeagnus umbellata*	2-6m	Leaves: Silvery when unfolding turning bright green, Flowers: Creamy yellow bell shaped, Berries: Red	Fragrant flowers in May to June. Berries in October to December.	Provides nectar for bees and butterflies, and food for wild birds	Any reasonable soil, preferably in good sun.	Deciduous
Escallonia *Escallonia macrantha*	1-3m (Species dependent)	Leaves: Dark green and glossy, Flowers: Pinkish red, Berries:	Flowers June to September	Provides nectar for bees and butterflies.	Full sun or light shade.	Evergreen
Fuchsia *Fuchsia magellancia*	2-3m	Leaves: Dark green leaves, Flowers: Purple and red.	Flowers: July to October	Attracts bees.	Full sun or light shade.	Deciduous
Hebe *Hebe spp.*	80cm		Flowers May-September (depending on variety).	Food source for 26 species of butterfly including the Speckled Wood	Well-drained soil in full sun. Plant semi-ripe cuttings in a cold frame in summer.	Evergreen
Hebe *Hebe albicans.*	30cm x 90cm	Leaves: Small and Green, Flowers: White	Flowers in June to July.	Nectar for bees and butterflies.	Well-drained soil in full sun. Plant semi-ripe cuttings in a cold frame in summer.	Evergreen

Hebe *Hebe andersonii 'variegata'.*	To 2m	Leaves: Small and Green, Flowers: Mauve	Flowers in August to September.	Good for invertebrates with a late supply of nectar	Well-drained soil in full sun. Plant semi-ripe cuttings in a cold frame in summer.	Evergreen
Hebe *Hebe brachysiphon.*	To 2m	Leaves: Small and Green, Flowers: White	Flowers in June to July.	Nectar for bees and butterflies.	Well-drained soil in full sun. Plant semi-ripe cuttings in a cold frame in summer.	Evergreen
Hebe *Hebe salicifolia.*	90-150cm	Leaves: Small and Green, Flowers: White	Flowers in June to September.	Nectar for bees and butterflies.	Well-drained soil in full sun. Plant semi-ripe cuttings in a cold frame in summer.	Evergreen
Shrubby Helichrysum *Helichrysum italicum*	60cm	Leaves: Grey-green silvery leaves, Flowers: Yellow.	Yellow flowers in June to August.	Nectar source for bees and butterflies	Well-drained sandy soil in full sun.	Evergreen
Hydrangea *Hydrangea spp.*	1-2.5m	Leaves: Green, Flowers: Depends upon species/varieties.	Flowers July to September	Provides nectar for bees and butterflies.	Well-drained fertile soil in full sun. needs watering through dry spells.	Deciduous
St. John's Wort aka 'Rose of Sharon' *Hypericum calycinum*	To 1m	Leaves: Green turning red in autumn, Flowers: Yellow, Berries: Red	Flowers June to October.	Flowers attract insects especially bees. Berries are eaten by birds and small mammals.	Full sun or light shade. Plant semi-ripe cuttings in a cold frame in summer.	Semi-evergreen
Hyssop *Hyssopus officinalis*	60cm	Leaves: Green, Flowers: Small blue flowers on spikelets.	Low evergreen shrub	Attractive for some butterflies	Well-drained fertile soil in full sun.	Semi-evergreen
Holly 'Golden King' *Ilex altaclerensis*	300 x 150+ cm	Leaves: Glossy green with yellow borders and small spines, Flowers: Small pink/white, Berries: Bright red.	Flowers: May. Berries: (only on female trees) October to December.	Berries good for birds and small mammals. Holly leaf miner provides winter food for birds.	Any reasonable soil in full sun or partial shade. Need male and female plants near each other to produce berries.	Evergreen
Lavender *Lavandula angustifolia*	75 x 75 cm	Leaves: Greyish-green, Flowers: Blue/purple.	Flowers: July to September	Attracts butterflies	Plant semi-ripe cuttings in a cold frame in summer.	Evergreen

Oregon Grape *Mahonia aquifolium*	1m	Leaves: Green and glossy with small spikes, Flowers: Yellow.	Flowers March to April	Nectar for bees and butterflies.	Thrives best in partial shade.	Evergreen
Daisy Bush *Olearia haastii*	1-2m	Leaves: Green and glossy, Flowers: White.	Flowers white, July to August	Nectar for bees and butterflies.	Well drained soil in full sun.	Evergreen
Russian Sage *Perovskia atriplicifolia*	1m	Leaves: Greyish-green, Flowers: Blue/purple.	Flowers: August to October	Good for bees	Full sun essential	Deciduous
Mock Orange *Philadelphus coronarius*	1.5-3m	Leaves: Yellow and green, Flowers: White.	Flowers June to July.	Nectar for bees and butterflies.	Full sun.	Deciduous
Firethorn *Pyracantha atalantioides*	3m	Leaves: Dark green, Flowers: White, Berries: Red/orange	Berries: October-January	Good for nesting thrushes and a site or an open robin box. Nectar for bees, berries for birds.	Thrives in most good soils.	Evergreen
Firethorn *Pyracantha coccinea*	To 3.5m	Leaves: Dark green, Flowers: White, Berries: Red/orange	Berries: October-January	Good for nesting thrushes and a site or an open robin box. Nectar for bees, berries for birds.	Thrives in most good soils.	Evergreen
Black Current *Ribes nigrum*	2m	Leaves: Green , Flowers: Pink, Berries: Black.	Flowers: April.	Good for bees, birds and small mammals	Thrives in full sun or partial shade.	Deciduous
Ornamental Current *Ribes odoratum*	2m	Leaves: Green turning purple in Autumn, Flowers: Yellow, Berries: Black.	Flowers: April.	Good for bees and birds	Thrives in full sun or partial shade.	Deciduous
Flowering Currant *Ribes sanguineum*	2m x 1.5m	Leaves: Green , Flowers: Pink, Berries: Black.	Flowers March to April	Provides nectar for bees and butterflies.	Full sun or light shade.	Deciduous

Rosemary *Rosemarinus officinalis*	1.5m	Leaves: Green and thin, Flowers: Lilac.	Flowers April to May.	Nectar source for bees and butterflies	Well-drained soil in full sun.	Evergreen
Blackberry *Rubus fruticosus*	Sprawling plant 1.5-2.5m	Leaves: Green with thorns on underside, Flowers White, Berries: Red turning black when ripening	Flowers May to September with berries following the flowers until mid September.	Nectar source for bees and butterflies. Berries for birds and mammals.	Any soil in full sun or partial shade. Can be very invasive.	Deciduous shrub
Loganberry *Rubus loganobaccus*	1.5-2.5m	Leaves: Green with thorns on underside, Flowers White, Berries: Dark red, Stems also have thorns.	Flowers May to August with large berries following.	Nectar source for bees and butterflies. Berries for birds and mammals.	Any reasonable soil in full sun or partial shade.	Deciduous shrub
Shrubby Ragwort *Senecio greyi*	1m	Leaves: Bluish green upper with silvery hairy underside, Flowers: Yellow.	Flowers in June.	Nectar source for bees and butterflies	Well-drained soil in full sun.	Evergreen
Skimmia *Skimmia japonica*	To 1m	Leaves: Dark glossy green, Flowers: White, Berries: Red (but only if male and female trees are located near each other).	Flowers in April to May.	Nectar source for bees and butterflies	Well-drained, neutral to acid soil in full sun or partial shade.	Evergreen
Bridal Wreath *Spiraea arguta*	2m	Leaves: Green, Flowers: Masses of white flowers.	Flowers April to May	Nectar for bees and butterflies.	Full sun on most soils	Deciduous
Snowberry *Symphoricarpos albus*	1-2m	Leaves Green, Flowers: Small and pink in terminal spikes, Berries: White.	Flowers: June to September.	Caterpillars of the death's head hawk moth feed on the leaves. Good ground cover. Birds may feed on the berries when other food is scarce.	Forms dense thickets unless regularly pruned.	Deciduous

Lilac *Syringa vulgaris*	150 x 300cm	Leaves Green, Flowers: Colour depends on variety, in terminal spikes.	Flowers May to June	Nectar for bees and butterflies.	Best in full sun.	Deciduous
Viburnum *Viburnum bodnantense*	1-2.5m	Leaves: Green, Flowers: Pink.	Flowers January to March.	Provides early nectar source for invertebrates and berries for birds. One of the most valuable winter flowering shrubs.	Sun or shade in most soils.	Deciduous
Laurustinus *Viburnum tinus*	2-6m	Leaves: Green, Flowers: White to pink, Berries: Blue/black.	Flowers November - February	Provides late nectar source for invertebrates and berries for birds.	Sun or shade in most soils.	Evergreen
Weigela *Weigela florida*	1.2m x 1.2m	Leaves: Green or green with yellow tinges (variety dependant), Flowers: Pink.	Flowers May to June	Provides nectar for bees and butterflies.	Rich, moist soils in full sun or partial shade.	Deciduous
Native Herbaceous						
Teasel *Dipsacus fullonum*	2m	Leaves: Green, Flowers: Light purple.	Flowers: July to August.	A food source of the Brimstone butterfly. Attracts other insects for its nectar and birds for its seeds.	Well-drained soil in full sun or light shade.	Biennial
Purple Loosestrife *Lythrum salicaria*	To 1.8m	Leaves: Green, Flowers: Purple.	Flowers in June to September.	Provides nectar for bees and butterflies.	Humus-rich soil in full sun or light shade with plenty of water, preferably boggy.	Border perennial
Musk Mallow *Malva moschata*	60cm	Leaves: Green Flowers: Pink	Flowers between July and August.	Provides nectar for bees and butterflies.	Well-drained soil in full sun.	Border perennial
Cat-mint *Nepeta cataria*	60-90cm	Leaves: Green above, white below. Flowers: White	Flowers July to September	Berries for birds and nectar for insects.	Well-drained soil in full sun.	Perennial

Wild Marjoram *Origanum vulgare*	50-70cm	Leaves: Green Flowers: Pale pink	Flowers July to September	Good plant for butterflies and bees	Dry soil preferably on calcareous soil.	Perennial
Tormentil *Potentilla erecta*	30-45cm	Leaves: Green, Flowers: Yellow.	Flowers June to September	Good plant for butterflies and bees	Well drained soil preferably acidic.	Perennial
Goldenrod *Solidago virgaurea*	70-100cm	Leaves: Green. Flowers: Yellow	Flowers July to September	27 species of lepidoptera.	Open woodland, grassland and hedgerows. Well-drained soil. Full sun or light shade.	Perennial
Betony *Stachys officinalis*	To 60cm	Leaves: Green. Flowers: Pink/purple	Flowers June to September	Nectar source for bees and butterflies	Well-drained soil in full sun or partial shade.	Border perennial
Common Valerian *Valeriana officinalis*	Stems to 1m	Leaves: Green. Flowers: Pink/white.	Flowers June to September	Provides nectar for bees and butterflies.	Dry or damp grassy or rough ground.	Perennial
Introduced Herbaceous						
Rockery Alyssum *Alyssum saxatile*	20cm	Leaves: Green, Flowers: Bright yellow.	Flowers April to June	Provides nectar for bees and butterflies.	Grows well in poor, well-drained soil in full sun. It can soon spread if left unchecked.	Perennial
Michaelmas Daisy *Aster novae-belgii*	To 75cm	Leaves: Green, Flowers: Dark pink.	Dark pink flowers in September to October.	Good for invertebrates with a late supply of nectar.	Well-drained soil in full sun. Needs watering in dry weather.	Border perennial
Perennial Wallflower *Erysimum 'Bowles Mauve'*	To 75cm	Leaves: Dark green, Flowers: Mauve.	Blooms nearly all year round.	Provides nectar for insects.	Well-drained non-acid soil in full sun.	Evergreen perennial
Dame's-violet *Hesperis matronalis*	60-100cm	Leaves: Green Flowers: Pink	Flowers May to July.	Very good nectar source for bees and butterflies.	Well-drained soil in full sun or partial shade.	Border perennial

Candytuft *Iberis sempervirens*	20cm high with 60cm spread.	Leaves: Dull yellowish green, Flowers: White.	Flowers May to June	Very good nectar source for bees and butterflies.	Well-drained soil in full sun.	Rocky perennial
Golden Rays aka Leopardplant *Ligularia dentata*	To 1m	Leaves: Bluish green, Flowers: Yellow.	Flowers July to September	Provides nectar for bees and butterflies.	Humus-rich soil in light shade with plenty of water, preferably boggy.	Border perennial
Ice Plant *Sedum spectabile*	60 x 30cm	Leaves: Grey/green. Flowers: Pink	Flowers, June to October.	Provides nectar for bees and butterflies. The plant is extremely good for butterflies.	Average garden soil in full sun	Perennial
Nasturtium *Tropaelumm majus*	1.8m	Leaves: Green. Flowers: Red, orange and yellow.	Flowers: June-October	Good for bees and beetles. Seeds eaten by birds and small mammals. Good insect plant.	Plant in sun or partial shade. Likes poor soil.	Climbing annual
Native Climbers						
Clematis 'Old Mans Beard' *Clematis vitalba*	Climber to 30m	Leaves: Green. Flowers: White/green	Flowers in July	Provides nectar for bees and butterflies.	Prefers calcareous and alluvial soils	Deciduous
Ivy *Hedera helix*	Climber	Leaves: Dark green, shiny. Flowers: Green/yellow. Berries: Black	Flowers October to November.	Provides late nectar source and cover/hibernating sites for invertebrates. Food source for the Holly Blue butterfly larva.	Trees, banks, rocks and crawling over the floor. Thrives in shade. Remove and plant rooted runners in spring.	Evergreen
Hop *Humulus lupulus*	Climber to 8m	Leaves: Yellowish-green, Flowers: Small yellowish brown.	Flowers July to August	Provides nectar for bees and butterflies.	Well-drained soil in full sun or light shade.	Perennial
Honeysuckle *Lonicera periclymenum*	Climber to 6m	Leaves: Dark green on top and bluish underneath. Flowers: red outside cream within Berries: Bright red.	Flowers July to August	Excellent food source for invertebrates including the Speckled Wood butterfly. Berries eaten by birds.	Woods, scrub and hedges. Sun or light shade. Plant semi-ripe cuttings in a cold frame in summer or Layer stems in spring	Deciduous

Introduced Climbers						
Everlasting Pea *Lathyrus latifolius*	Spreading climber to 1.8m.	Leaves: Green, Flowers: Pink-purple. Has long thin seed pods.	Flowers in July to September.	Provides nectar for bees and butterflies.	Well-drained soil in full sun or light shade.	Border perennial
Japanese Wisteria *Wisteria floribunda*	Climber (needs tying)	Leaves: Yellowish-green Flowers: Blue-purple in large drooping clusters.	Flowers early to mid summer but may not flower for the first year or two.	Provides nectar for bees and butterflies.	Well-drained soil in full sun or light shade. Needs plenty of space.	Evergreen

APPENDIX 3:
BIRD BOX, BAT BRICK & LADYBIRD/LACEWING BOX DETAILS

BIRD BOXES

ATTRACTING BIRDS TO GARDENS

Initially to entice birds to an area, a good source of food must be available, so to attract birds to a garden provision of a bird table may be a good idea. The choice of plants within the garden must also be considered.

Plants producing large seed heads such as Sunflowers or Michaelmas Daisies are recommended, as are berry producing plants and shrubs such as Cotoneaster, Honeysuckle, Holly and Hawthorn. Larger shrubs also provide branches for birds to perch on and roosting sites. A source of water, not only for drinking but also for bathing, is also of an advantage.

In many new developments there may be a plentiful supply of food, however there may be nowhere for birds to nest. Provision of nesting boxes is therefore also vital to minimise the net biodiversity loss.

MATERIALS

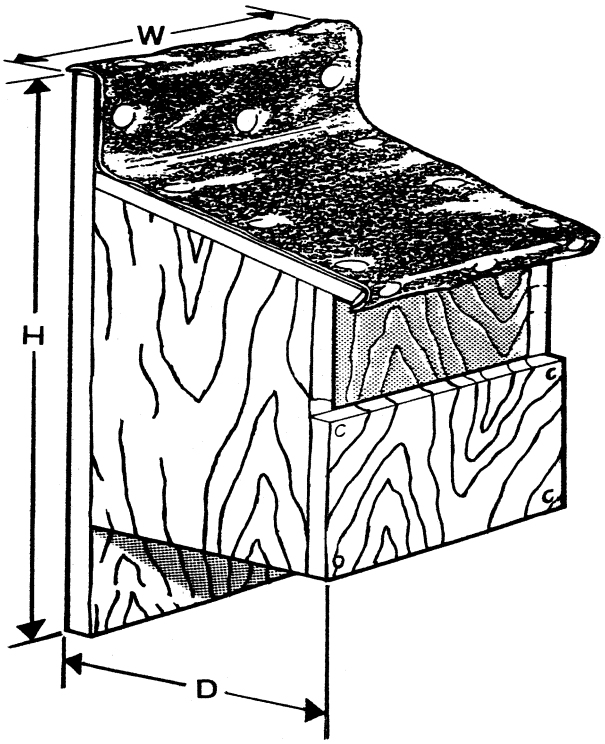
Bird boxes are generally constructed from wood or woodcrete (a concrete and wood paste). Any wood may be used, however it should be at least 15 mm thick, 20mm is ideal. Wood preserver should never be used on the inside of the nesting box.

TIME TO ERECT BOXES

Boxes should be erected by March, but the earlier the better, as most birds seek out suitable nest sites some time before they start to construct their nest.

POSITIONING THE BOX

Position the entrance facing away from the midday sun (south), ideally facing east to take advantage of the early morning sun. Boxes should not be positioned on the north of buildings. Angle the box slightly forward to keep out sun and rain. All boxes should have a clear flight path to the entrance. Most boxes should be positioned at a height of 2–3 metres however this varies between bird species. The optimum density for boxes depends on the species and habitat.



HOLE ENTRANCE BOXES

Hole entrance boxes will attract a variety of birds, including the following species which are detailed further below:

- Barn Owl
- Nuthatch
- Jackdaw
- Starling
- All Tit species

BARN OWLS

Size: 450mm wide, 450mm high, 750mm Deep. Entrance: 150mm wide by 200mm high. The bigger the box the better! But allow for an extended floor for the young birds to exercise on. Siting: Boxes can be placed in trees, inside buildings or in straw stacks. Density: Two boxes sited in one territory would be of an advantage as they require both roosting and nesting sites. Barn owls are sensitive to disturbance. Try to position boxes at least 5 metres above ground level. Boxes sited on the edge of existing owl strongholds will bring the best results. Clean out the box every year, leaving a thin layer of pellets, new boxes should be lined with bark chippings.

BLUE TIT

Size: 100mm wide, 100mm deep and 150mm high, 25mm diameter entrance hole. Siting: 2-6 metres high. Density: Up to 6 per Ha. prefer a small box (see Blue tit) but still with a 28mm diameter entrance hole. Density: Up to 4 per Ha.

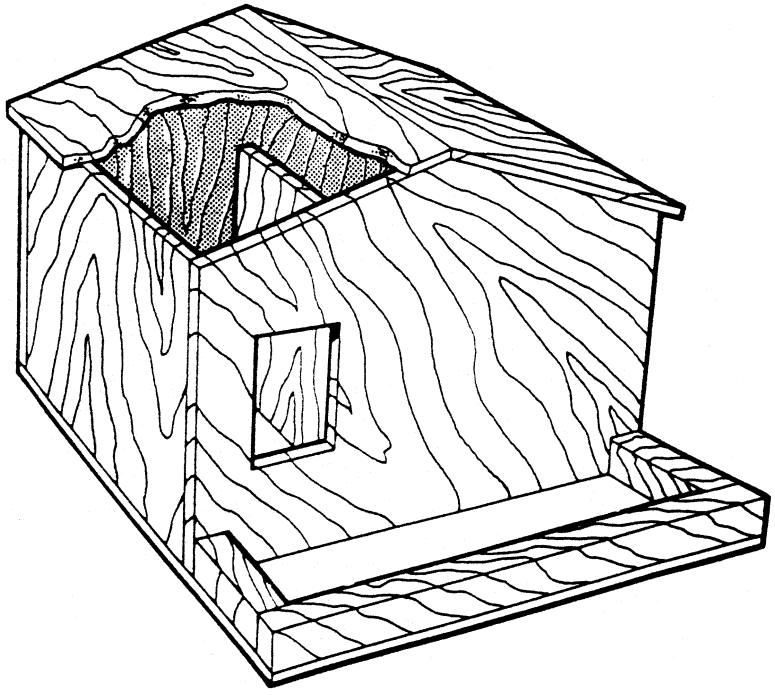
MARSH TIT

Size: 100mm wide, 100mm deep and 150mm high, 25mm diameter entrance hole. Sited: Up to 2 metres high. Density: No more than 1 box every 2 Ha.

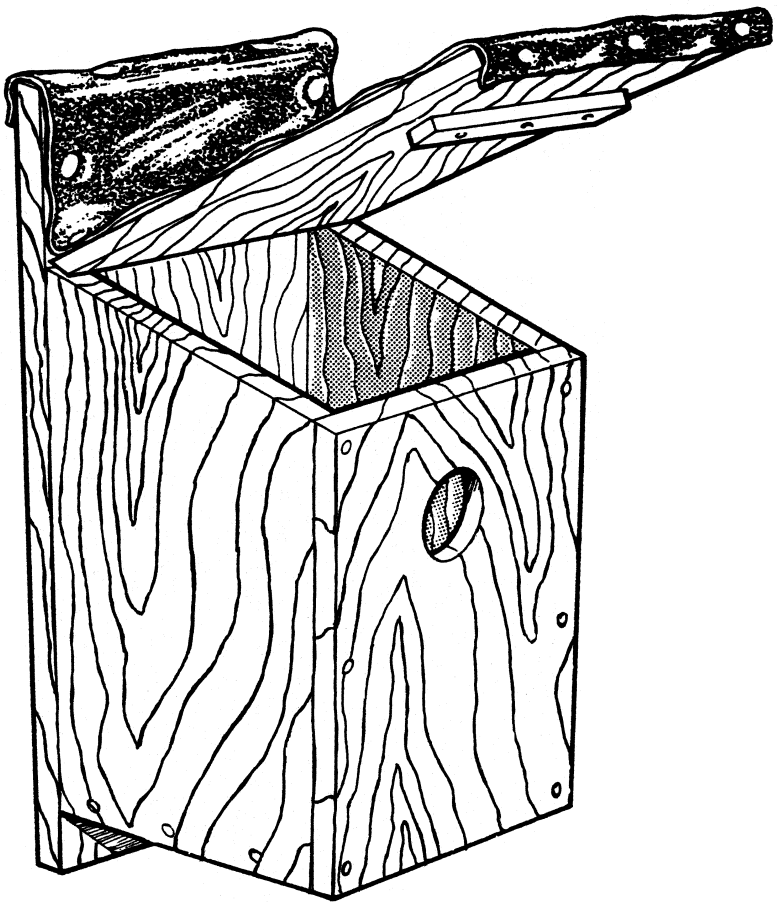
GREAT TIT

Size: 130mm wide, 130mm deep and 500mm high, 28mm entrance hole. Siting: 2-6 metres high. For roosting these birds

BARN OWL BOX



BASIC HOLE ENTRANCE BOX



COAL TIT

Size: 100mm wide, 100mm deep and 150mm high, 25mm diameter entrance hole. Siting: Up to 2 metres in deciduous woodland or on an isolated conifer tree. Density: No more than 1 box every 2 Ha.

WILLOW TIT

Size: 100mm wide, 100mm deep and 150mm high, 25mm diameter entrance hole. Siting: Up to 2 metres high in thick cover. Will only colonise new areas if existing population is located near by. Fill box with wood shavings. Density: No more than 1 box every 2 Ha.

NUTHATCH

Size: 130mm wide, 130mm deep and 200mm high, 32mm diameter entrance hole. Siting: 2-6 metres high. Density: 1 box per hectare

JACKDAW

Size: 200mm wide, 200mm deep and 450mm high, 150mm diameter entrance hole. Siting: 6+ metres high. These birds are very secretive and need an inconspicuously placed entrance. Density: May nest colonially, therefore several boxes can be placed close together.

STARLING

Size: 200mm wide, 200mm deep and 450mm high, 45mm diameter entrance hole. Siting: Boxes can be located on trees or high up in the eaves of houses. Density: May nest colonially; can erect boxes on adjacent trees or buildings.

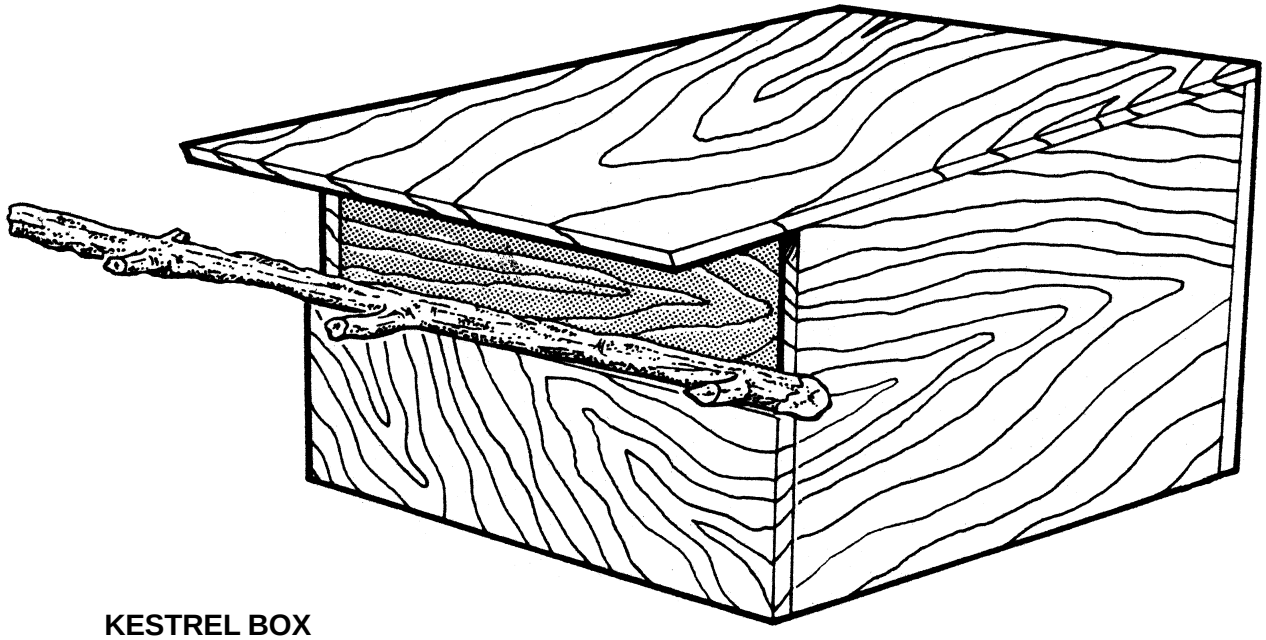
OPEN FRONTED BOXES

These boxes will attract a number of species, including the following birds:

- Kestrel
- Robin
- Wren
- Black Redstart
- Blackbird
- Pied Wagtail
- Spotted Flycatcher

KESTREL

Size: 300mm wide, 500mm deep, 300mm high, front 150mm high. Siting: Box should be mounted at least 5 metres above the ground, sloping slightly backwards to keep the eggs and young at the rear of the box. The opening should be south-east facing with a clear flight path to the entrance. The box can be tree or pole mounted. The pole needs to be fixed firmly in the ground, using concrete, extending to a height of 3 metres or more, enabling the use of a ladder for maintenance purpose. Fix a strong perch along the top of the entrance, extending to one side, to allow both the adult and young to sit outside the box. Density: 1 box per 100 Ha.



KESTREL BOX

SPOTTED FLYCATCHER

Size: 150mm wide, 100mm high, 100mm deep, front 25mm high. Siting: These boxes should be erected on walls covered in ivy or honeysuckle overlooking a glade or lawn, positioned at a medium height (2-6 metres). Ensure a perch is available close by, a simple stick stuck in the ground a couple of metres from the box will suffice. Density: 1 box per ha.

ROBIN

Size: 100mm wide, 100mm deep and 150mm high. Siting: Boxes should be sited up to 2 metres high in a well hidden location, protected by thorny shrubbery. Density: No more than 1 box per 0.5 Ha.

WREN

Size: 100mm wide, 100mm deep and 150mm high. Sited: Up to 2 metres high. Wren will use both open fronted and hole entrance nesting boxes. A 30mm entrance is required in a small or very small box (see Blue tit). Siting: The box needs to be mounted low, up to 2 metres in thick undergrowth. Density: Clusters of 2 or 3 boxes per 0.5 Ha will cater for successive broods by the resident pair.

PIED WAGTAIL

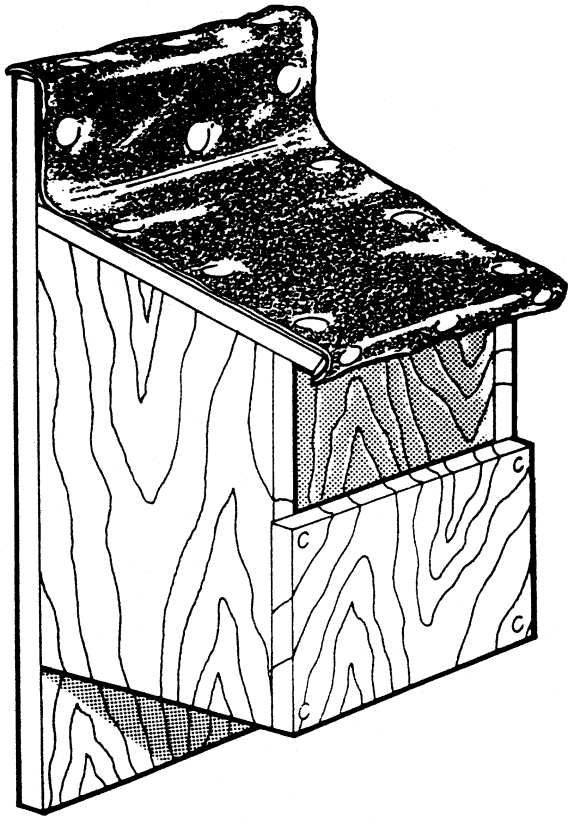
Size: 100mm wide, 100mm deep and 150mm high. Siting: These birds are very adaptable and the box can be sited in almost any situation – walls overlooking lawns, farm outbuildings, under bridges etc. Density: 1 box per 5 Ha.

BLACK REDSTART

Black redstarts are rare in Britain, with its populations concentrated in urban centres. They prefer complex vertical structures which provide them with high singing posts.

Size: 100mm wide, 100mm deep and 150mm high. Nest box entrance should not allow access to larger birds like feral pigeons. Siting: Boxes should be placed on tall buildings underneath structures like overhangs, balconies and escape routes. Density: A large number of nest boxes should be erected to give pairs some selection.

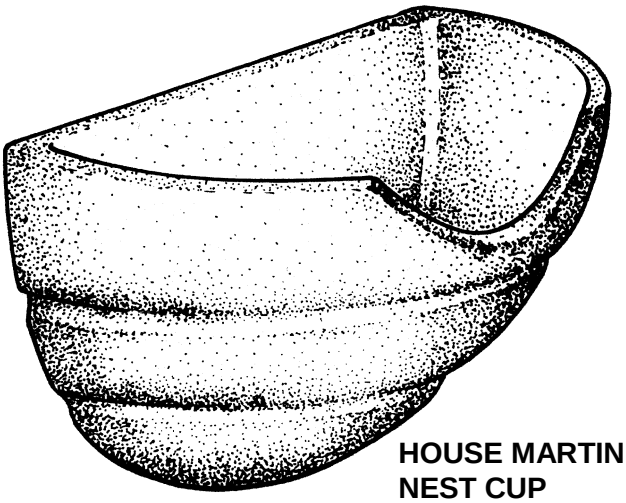
BASIC OPEN FRONTED NEST BOX



SPECIAL BOXES

HOUSE MARTIN

Internal dimensions: 70mm high, 120mm wide at back, 90mm deep.
Material: Concrete.
Siting: Boxes should be mounted under eaves, at least 2 metres high. Eaves should have an overhang of at least 150 mm to provide sufficient shelter. Ensure water cannot trickle into box. Density: House martins nest colonially; therefore nest cups should be grouped to encourage colonisation.



HOUSE MARTIN NEST CUP

HOUSE SPARROW

Size: 555 mm wide, 210 mm high (front) and 265 mm high (back), 170 mm deep. 32mm entrance hole. House sparrows prefer to nest communally in boxes called terraces. Each box has three discreet nesting compartments, with entrance holes (one or two per compartment) located just under the lid. Siting: Boxes should be positioned at least 3 m above ground level; placing boxes under the eaves is ideal.
Density: This species nests colonially, but individual nest entrances should be at least 150mm apart.

SWALLOW

Size: This simple bowl shaped nest is 110 mm high, 250 mm wide and 14 cm deep.
Siting: Nesting bowls should be sited as high as possible on ledges or rafters within buildings. Nest should be mounted with at least 100 mm of headroom.
Density: Swallows are sociable birds, however, nests should be placed no closer than 1 m apart.

HOUSE SPARROW BOX Photo by Dr Roger Chittock

BAT BOXES & BAT BRICKS

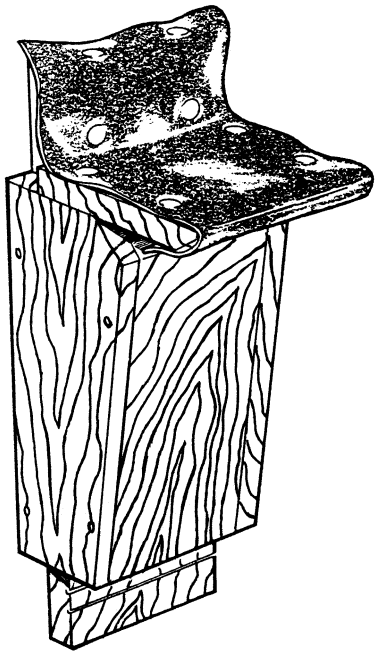
All British bat species present are protected by law, as their numbers have decreased rapidly within recent years. Bats, along with birds and spiders, are important insect predators, and are a vital part of the biological control of pests. An individual bat can eat up to 3,000 midges per night. For these reasons it is vital to incorporate features suitable for bats into developments.

BAT BOXES

Most British species of bats will use bat boxes, to varying degrees, but those most commonly found include pipistrelles, leisler's, noctules and *Myotis* species. Bat boxes should be positioned in sunny locations, on trees or walls, mainly to the south or west, but a variety of different positions would provide a range of climatic conditions. Boxes should be placed as high as possible, at heights of between 3 to 6 metres. The entrance should be free from obstruction. As bats use a number of different roosts throughout the year, it is best to erect them in groups of 3 to 5 boxes across the site, to include a range of different aspects.

WOODEN BAT BOXES

Size: 100mm wide, 80mm deep and 400mm high.
The entrance should be a narrow slot at least 20mm wide underneath the box, allowing the animal to crawl up into the roost
Wood should be rough and at least 20mm thick. The thickness of the wood helps to protect the bats from changes in temperature. Most importantly, wood should be left untreated internally as some wood treatments are toxic to bats and smell unpleasant.



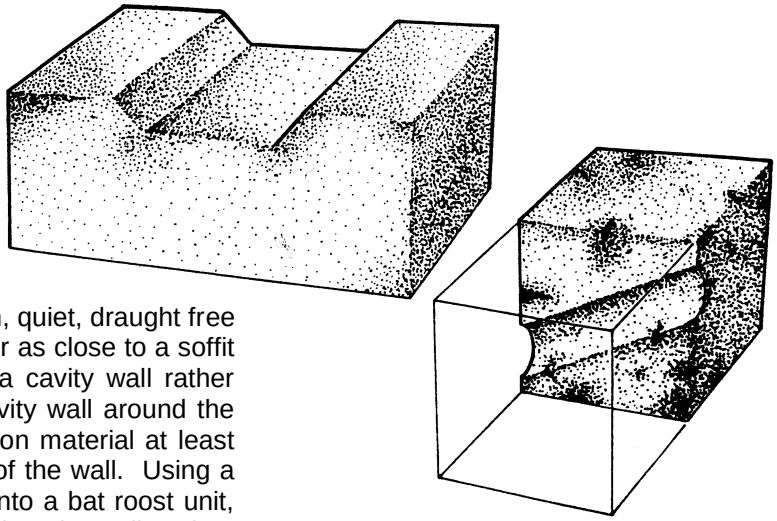
WOODCRETE BAT BOXES

Commercially made bat boxes, such as Schwegler boxes, are available in a number of designs for use in many of different locations, including trees, buildings and bridges. Certain models can also be designed into the fabric of buildings or bridges. The advantage of these boxes is that woodcrete is much longer lasting and more weather resistant than wood.

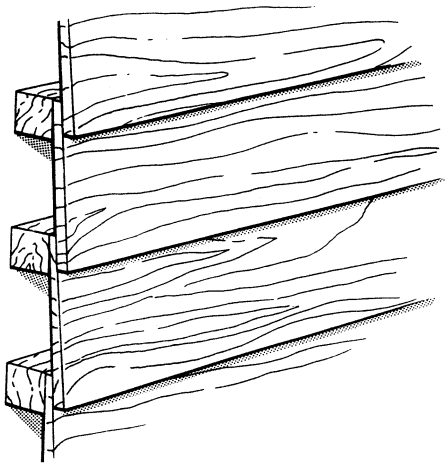
WOODCRETE BAT BOXES SUITABLE FOR PIPISTRELLES (L) AND NOCTULES (R)

BAT BOXES FOR BUILDINGS
Photo by Nick Steggall

OTHER ROOSTING FEATURES
An alternative to bat boxes is to incorporate roosting features into the buildings structure.



BAT BRICKS
Bat bricks should be placed in a clean, quiet, draught free environment, ideally on a gable end or as close to a soffit as possible. Most bats will roost in a cavity wall rather than in a loft or large space. The cavity wall around the bat brick should be free from insulation material at least from the level of the brick to the top of the wall. Using a good quality bat brick, which enters into a bat roost unit, can prevent bats from gaining access into the wall cavity.



OUTSIDE WALLS
Battens and overlapping boards positioned on the outside of a building can also provide a roosting location. Fix 30mm battens to the upper part of a gable end wall, ideally facing south or west, and nail on horizontal overlapping boards or hanging tiles making sure to leave holes of sufficient size (at least 20mm x 100mm) allowing the bats to enter the roosting site.

Bat Access and Bat Roost Bricks

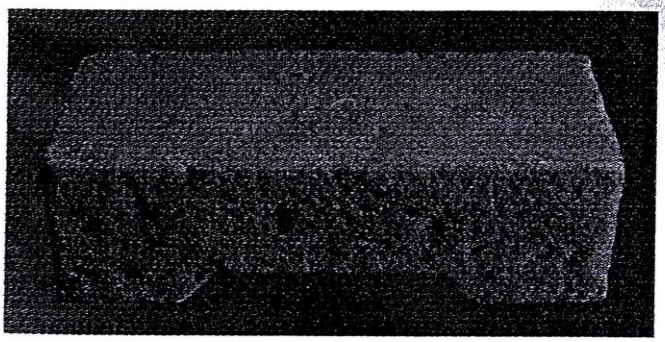
Approved by the Bat Conservation Trust

Over recent years Marshalls Clay Products has become almost as well known for the success of its award winning environmental work as it is for the quality of its brick products. Our land restoration and nature conservation schemes, first developed by Yorkshire Brick Company, have become an integral part of our activities over the years and have been recognised as some of the most successful of their kind anywhere.

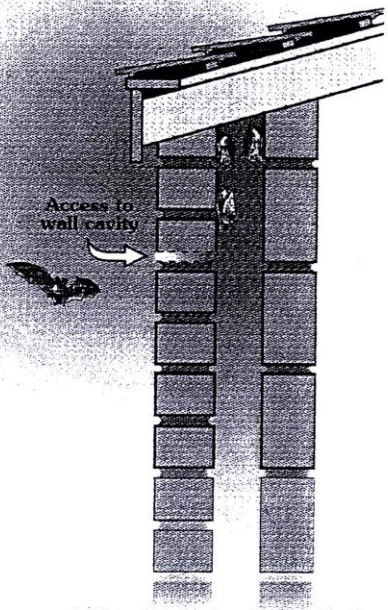
As part of this ongoing philosophy, Marshalls Clay Products have been producing a special Bat Access Brick, specially designed to help the country's badly depleted bat population by providing access to wall cavities or roof spaces where most bat colonies tend to be. *(see diagram)*

In recent years bats have been declining at an alarming rate, (estimates suggest as much as 60%) loss of habitat being a key factor in this decline. Nearly all colonies tend to be on the outside of houses, in wall cavities, under slates, flashing or tiles, etc.

Contrary to popular opinion bats do not make nests and do absolutely no damage to buildings or roof timbers, indeed many people encourage bat colonies in their area because of the large number of insect pests, woodworm, etc. which they eat. Most colonies will use a house for only a few weeks in summer before dispersing by the autumn.



Marshall's Bat Access Brick, which is now also available in stone

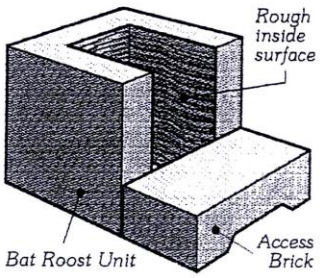


A Bat Brick should ideally be placed as high as possible, at the gable apex or close to the soffit.

Bat Roost Unit

A recent survey of bridges in Yorkshire found that 25% were being used by bats. Other reports showing similar findings suggest that large number of tunnels and bridges are occupied by bats. As bats are protected under the 1981 Wildlife and Countryside Act, engineers should attempt to preserve the bat habitat while carrying out essential maintenance to these structures. If bats are known to use the structure, the Country Agency for Nature Conservation should be consulted.

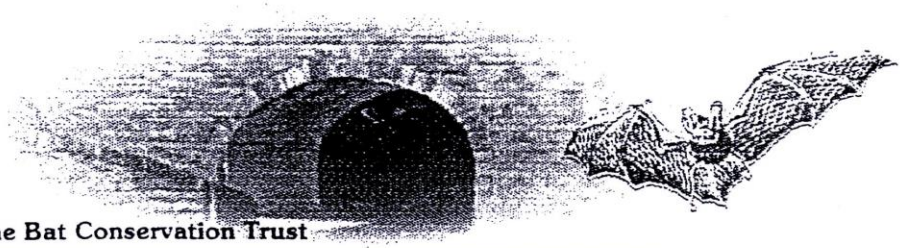
Following a meeting with The Bat Conservation Trust and British Waterways Technical Services Department, Marshalls Clay Products have developed an elegant solution in the form of their Bat Roost Unit. Used in conjunction with the Bat Access Brick, the unit provides a rough surfaced cavity of 110 X 150 X 215 mm. The module can be used in repairs to bridge arches and abutments as well as in many new construction projects.



Marshalls

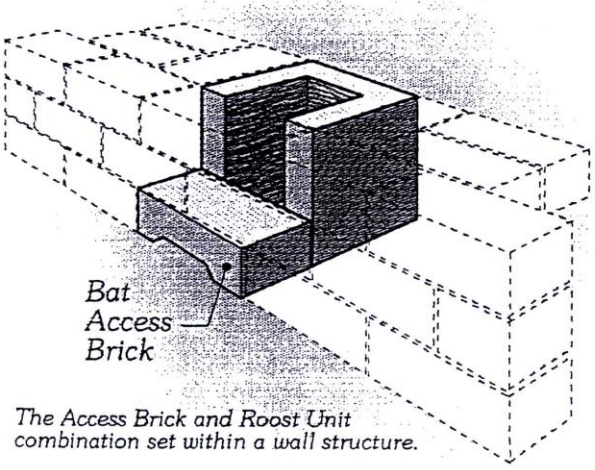
CLAY PRODUCTS
Quarry Lane, Howley Park, Woodkirk, Dewsbury, West Yorkshire WF12 7JJ
Tel (01132) 203535 Fax (01132) 203555

Bat Roost Unit

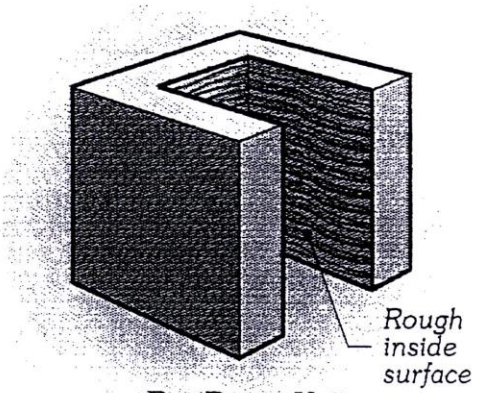


Approved by The Bat Conservation Trust

The preservation of bat habitats is very important to help maintain the diversity of bat species in this country. Engineers and specifiers can now play a significant role by specifying Bat Access Bricks and Bat Roost Units in repair and maintenance work. The Access Unit/Roost Unit combination has been carefully designed to work not just in new or existing walls but also within brick and stone arch structures.



The Access Brick and Roost Unit combination set within a wall structure.



Bat Roost Unit

Bat Access Bricks have been supplied in significant numbers to large organisations such as British Waterways and British Rail, who operate continuous maintenance programmes on bridges and tunnels.

Other organisations are ordering smaller numbers for incorporation into building works and some private individuals are using Bat Access Units in their own homes.

Marshalls Bat Access and Roost Units are approved by the Bat Conservation trust.

For more information on these innovative products contact **Julie Cull** at **Marshalls Clay Products**.
Telephone 01132 203535 ext. 3458

Marshalls

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The Bat Conservation Trust

The Bat Conservation Trust is Britain's only organisation solely devoted to the conservation of bats and their habitats. The BCT aims to prevent further declines in bat populations and to encourage the recovery of threatened species.

If you would like more information about bats or would like to become a bat supporter please contact us at the address

The Bat Conservation Trust
15 Cloisters House
8 Battersea Park Road
London
Tel 0171 627 2629
Fax 0171 6272628

LADYBIRD & LACEWING BOX

Introduction

Ladybirds and Lacewings are natural predators and valuable consumers of common garden pests such as aphids (greenfly and blackfly etc.). By encouraging these natural predators, a greater number of garden pests are consumed, reducing the need for chemical pesticides.

Ladybird and Lacewing boxes provide a number of locations where these insects can spend the winter, ready to consume the common garden pests the following spring.

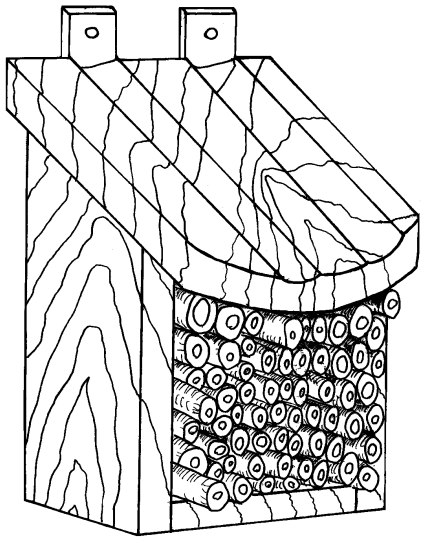
As most people are familiar with ladybirds and happy to have them in their garden, they make an ideal natural pest control method.

Materials

Cedar or Deal at least 20mm thick should be ideal. Never use wood preserver on the inside of the box. Inside the box, various diameters of hollowed bamboo canes should be used; canes should be a minimum of 100 mm long.

Positioning the Box

The boxes should be placed in sunny positions in hedgerows, shrubs, on tree trunks, fence and garden sheds.



PROJECT QUAD

London NW1 4JL

Sustainability Plan

LAST PAGE

AS A COMPLETE PDF DOCUMENT, THIS HAS 100 PAGES.