

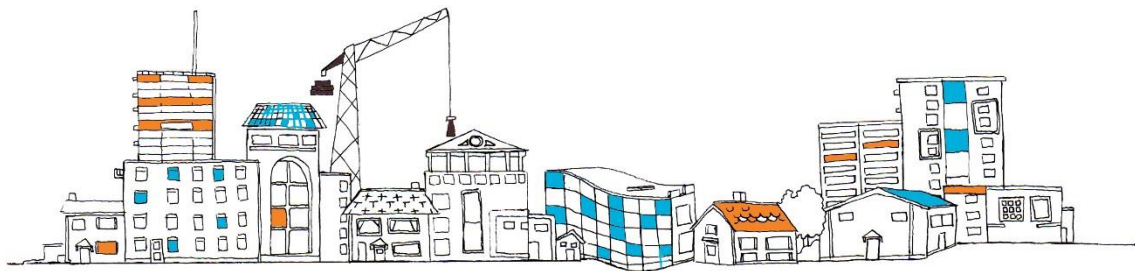
BREEAM Pre-Assessment Report

Site: Green Park Village School, Reading

Client: Berkeley Homes

Revision: D

Date: February 2018



Revision History

Revision	Issue date	Description	Issued by	Checked by
A	07/02/2018	Draft for comment	EW	RE
B	12/02/2018	Amendments following draft comments	EW	RE
C	13/03/2018	Minor amendments	EW	RE
D	28/03/2018	Final issue for planning	EW	RE

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Calculations contained within this report have been produced based on information supplied by the client and the design team. Any alterations to the technical specification on which this report is based, will invalidate its findings.

College Farm
Tetbury Road
Cirencester
GL7 6PY

Tel: 08458 386 387

info@energistuk.co.uk

www.energistuk.co.uk



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1. EXECUTIVE SUMMARY

Energist UK has been appointed by Berkeley Homes to provide a BREEAM Pre-Assessment to support the forthcoming planning application for the proposed New Two Form Entry Primary School at Green Park Village, located to the south of the Reading town centre. This is in order to achieve a BREEAM Very Good rating with a minimum score of 62.5% to satisfy the requirements of Reading Borough Council Core Strategy (Reading Core Strategy 2015: Summary Sustainable Development and Climate Change – Policy CS1 Sustainable Construction and Design

- All new housing is required to meet the most up to date Eco-Homes 'Very Good' as a minimum standard, and all new commercial developments are required to meet the most up to date BREEAM 'Very Good' as a minimum standard;
- On larger developments of more than 10 dwellings or 1,000 m2 of floorspace, ensure that 50% of the provision meets the most up to date Eco-Homes and BREEAM 'Excellent' standards;

For a detailed overview of the planning policy requirements specific to this development, refer to Appendix 2.

This report details the Pre-Assessment stage performance of the scheme as measured against the BREEAM 2014 New Construction (SD5076 Issue 5.0). The site is registered with BRE, BREEAM UK registration type: Fully fit-out School (BREEAM-0070-2647).

The report demonstrates that the development has the potential to achieve a score of 68.30%, which equates to a BREEAM Very Good rating. This allows the development to reach the minimum requirements as stated by Reading Borough Council. The graph shown in figure 1 summarises the predicted score under each BREEAM section.

This score is subject to complying with all the detailed requirements during the formal assessment stage and providing documentation in line with BREEAM criteria.

Building Performance by Environment Section

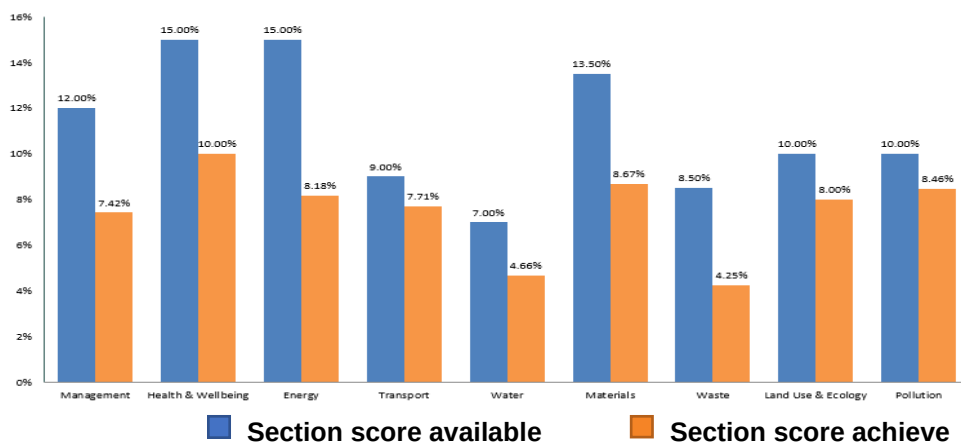


Figure 1: Showing performance of development by Environment Section

2. INTRODUCTION

Site description

Green Park Village is a residential led mixed use development located to the south of Reading town centre. It is centred around a landscaped lake, a primary school, community centre, extra care home and supporting retail.

The proposed project is a new two form entry school and will include nursery, KS1, KS2 classrooms, reception, catering, toilets and changing facilities, main hall, and studio, together with ancillary staff office space. These building areas will be fully fitted. The school will also include a sports pitch, MUGA and associated landscaping area.

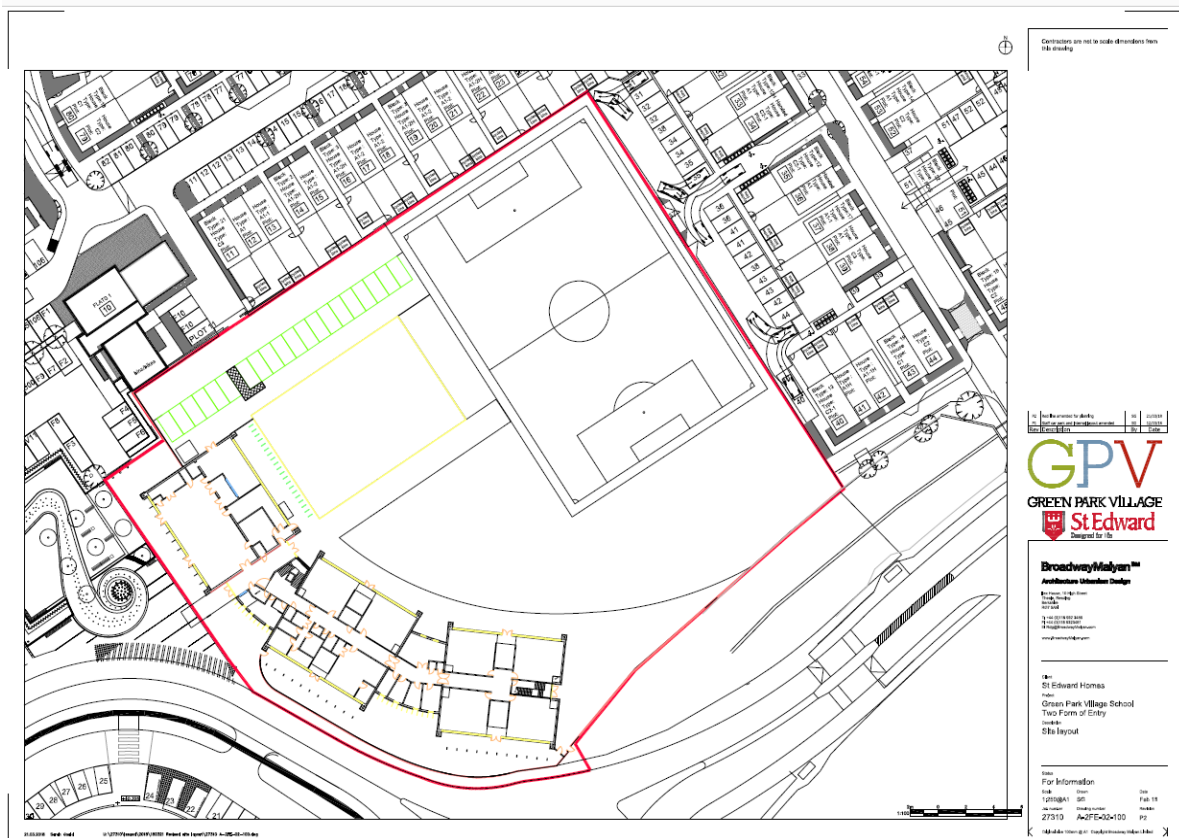


Figure 2. Site Plan

3. METHODOLOGIES

The Building Research Establishment Environmental Assessment Method ('BREEAM' hereafter) is an environmental assessment method for rating and certifying the performance of new construction projects. It is a national standard for use in the design and construction of

all new developments with a view to encouraging continuous improvement in sustainable building techniques.

The BREEAM Scheme is designed to evolve with increasingly tightening Building Regulations and the development of technology and innovations. The most recent version of BREEAM released in July 2014 places a greater emphasis on overall life cycle efficiencies and stakeholder participation.

The BREEAM Scheme covers nine categories of sustainable design (each of which contains a number of environmental issues), comprising:

- Management;
- Health & Wellbeing;
- Energy;
- Transport;
- Water;
- Materials;
- Waste;
- Land Use and Ecology; and
- Pollution.

A further 'Innovation' section is provided to award developments that exceed the levels set out in the standard criteria, where exemplary performance levels are achieved. Each issue is a source of environmental impact which can be assessed against a performance target and awarded one or more credits. In addition to meeting minimum standards (which vary according to the BREEAM rating sought), achievement of the requirements in each design category scores a number of percentage points. The overall total percentage 'score' then determines the BREEAM Rating achieved by the assessed development.

3.1 Scoring system

Credits are available for each category meeting the specified levels of performance. The number of credits available in each category does not necessarily reflect the relative importance of the issues being assessed, and will vary depending on the developments' Scheme type. Before the final score is calculated, each of the scores in the nine categories is multiplied by an 'Issue Weighting Factor' before the final score is calculated.

The BREEAM Rating is awarded on the basis of achieving both a set of mandatory minimum standards and a score level as set out above. The minimum standards vary depending on the rating required.

3.2 Minimum standards

Before the development can start to be awarded points under BREEAM New Construction 2014 Education School it must achieve minimum standards in the following categories:

Minimum standards for each rating level					
	Pass	Good	Very Good	Excellent	Outstanding
MAN 03: Responsible construction practices	None	None	None	One credit (considerate construction)	Two Credits (considerate construction)
MAN 04: Commissioning and handover	None	None	None	Criterion 10 (Building User Guide)	Criterion 10 (Building User Guide)
MAN 05: Aftercare	None	None	None	One credit (Seasonal commissioning)	One credit (Seasonal commissioning)
ENE 01: Reduction of energy use and carbon emissions	None	None	None	Five credits	Eight credits
ENE 02: Energy monitoring	None	None	One credit (First sub-metering credit)	One credit (First sub-metering credit)	One credit (First sub-metering credit)
WAT 01: Water consumption	None	One credit	One credit	One credit	Two credits
WAT 02: Water monitoring	None	Criterion 1 only	Criterion 1 only	Criterion 1 only	Criterion 1 only
MAT 03: Responsible sourcing of materials	Criterion 1 only	Criterion 1 only	Criterion 1 only	Criterion 1 only	Criterion 1 only
WST 01: Construction waste management	None	None	None	None	One credit
WST 03: Operation waste	None	None	None	One credit	One credit
LE 03: Minimising impact on existing site ecology	None	None	One credit	One credit	One credit

Figure 3: Table showing minimum standards required for each level of the BREEAM assessment

3.3 BREEAM assessment- a two stage process

The BREEAM scheme allows for a building to be assessed at the design stage and post-construction stage before the formal BREEAM Certification (and Rating) is awarded; this will ensure that the completed development meets sustainability performance as designed. During the certification assessment, which will lead to a formal BREEAM rating and certificate, the assessment stages are as follows:

The initial Design Stage certification – at this stage an Interim Certificate is issued, based on a provisional rating. A Post-Construction check is required to verify the rating in the 'as constructed' state before a Final BREEAM Certificate can be issued.

The Design Stage assessment and Post-Construction check must be carried out by a licensed assessor, who registers the assessment with the BRE.

This report forms the Pre-Assessment which is the initial stage of the Design Stage Certification process. Energist UK has verified with BRE that the development will be assessed under the BREEAM 2014 New Construction Scheme, and has been registered with BRE by Energist UK accordingly.

3.4 Approach and Methodology

In order to gain an understanding of the achievable BREEAM rating for the new 2FE school of the development site, Energist UK were appointed by the developers, Berkeley Homes, to undertake a BREEAM Pre-Assessment.

The purpose of this Pre-Assessment report is to identify the strengths and weaknesses of the proposals in relation to the BREEAM criteria, and to identify appropriate opportunities to achieve the required a score of 62.5% for Very Good rating.

The Pre-Assessment is intended to scope out how the development will score when the current designs are formally assessed under the BREEAM Scheme.

This BREEAM assessment is conducted under the New Construction 2014 scheme with manual version SD5076: 5.0 – 2014. The building type is classified as Education – Primary School. The assessment type is Fully Fitted Out.

BREEAM rating	% score
Outstanding	≥ 85
Excellent	≥ 70
Very good	≥ 55
Good	≥ 45
Pass	≥ 30
Unclassified	< 30

Figure 4: Table showing BREEAM rating and score

4. DEVELOPMENT SUMMARY AND RATINGS

Targeted Credits

During the Pre-Assessment the viability of credits were assessed with the aim of achieving BREEAM rating Very Good with a minimum score of 62.5%. The table below shows in "Targeted credits" how many credits are likely to be achieved with design in its current form. The column "Max credits" are the number of credits that are available for this particular development.

Category		Credit Title	Credits Available	Credits Targeted	Required Actions/Evidence
Management	MAN01	Project brief and design	4	1	Stakeholder Consultation (project delivery): roles and responsibilities of the delivery stakeholders
	MAN02	Life cycle cost and service life planning	4	3	Capital Cost Reporting of the building in £ per M2 A compliant LCC analysis carried out
	MAN03	Responsible construction practices	6	5	Legal timber Considerate Construction Scheme Monitoring construction site impacts (Utility and transport Consumption)
	MAN04	Commissioning and handover	4	3	Commissioning and testing schedule and responsibilities

					Commissioning building services Handover – Building user guide and training schedule
	MAN05	Aftercare	3	1	Aftercare support
Health and Wellbeing	HEA01	Visual comfort	5	4	Clare control Daylighting calculations View Out External Light Design Strategy
	HEA02	Indoor air quality	5	3	Indoor air quality (IAQ) plan Volatile organic compound (VOC); emission levels (products) Natural ventilation
	HEA04	Thermal comfort	3	2	Thermal modelling Thermal zoning and controls
	HEA05	Acoustic performance	3	2	Acoustic performance standards Sound insulation: programme of pre-completion Indoor ambient noise level

	HEA06	Safety and security	2	1	Design for safe access across external site; Security Needs Assessment
Energy	ENE01	Reduction for energy use and carbon emissions	12	5	Energy use and carbon emissions from SBEM
	ENE02	Energy monitoring	1	1	Sub-Metering of major Energy consuming systems
	ENE03	External lighting	1	1	Energy-efficient external lighting to be specified with all light fittings controlled by the presence of daylight.
	ENE04	Low carbon design	3	2	Passive design analysis Low or zero carbon (LZC) technologies is to be carried out with the results implemented.
	ENE06	Energy efficient transportation systems	3	3	Energy consumption Energy efficient features
	ENE08	Energy Efficient Equipment	2	0	building's unregulated energy consuming loads- Credit not sought
Transport	TRA01	Public transport accessibility	5	2	Average transport links available to site - TRA01 calculator
	TRA02	Proximity to amenities	1	1	500m of accessible local amenities appropriate to the building type and its users.
	TRA03	Cyclist facilities	2	2	covered, secure and well-lit cycle storage facilities and adequate changing facilities are provided for staff use.

	TRA05	Travel plan	1	1	Interim travel plan to consider travel options for building users
Water	WAT01	Water Consumption	5	2	Reducing the demand for potable water - Low-flowrate water fittings
	WAT02	Water monitoring	1	1	Pulsed output water meter on mains supply to unit
	WAT03	Water leak detection	2	2	Water leak detection system Flow control devices
	WAT04	Water efficient equipment	1	1	No unregulated water use
Materials	MAT01	Life cycle impacts	5	4	Materials to be of Green Guide Rating between A+ and B
	MAT02	Hard landscaping and boundary protection	1	1	>80% of hard landscaping to be Green Guide rating A+ or A
	MAT03	Responsible sourcing of materials	4	2	Legal timber throughout; Sustainable Procurement Plan; Maximise RSM points
	MAT04	Insulation	1	1	Insulation specified to be of high thermal efficiency and high Green Guide Rating
	MAT05	Designing for durability and resilience	1	1	Measures to be taken to protect vulnerable parts of the building from damage - vehicle collision and environmental degradation

	MAT06	Material efficiency	1	0	Opportunities will need to be identified in order to optimise the use of materials in all stages of the design – Credit not sought
Waste	WST01	Construction waste management	4	3	Resource Management Plan; Divert from Landfill
	WST02	Recycled aggregates	1	0	Significant use of recycled or secondary aggregates in 'high-grade' building aggregate uses - credit not sought
	WST03	Operational waste	1	1	Dedicated spaces for the segregation and storage of recyclable waste
	WST05	Adaptation to climate change	1	0	Conduct a climate change adaptation strategy appraisal for structural and fabric resilience – credit not sought
	WST06	Functional adaptability	1	0	Encourage measures taken to accommodate future changes of use of the building over its lifespan -credit not sought
Land Use and Ecology	LE01	Site selection	2	1	The majority of the footprint of the proposed development falls within the boundary of previously developed land.
	LE02	Ecological value of site and protection of ecological features	2	2	Ecologist report confirms ecological value & identify features to be protected
	LE03	Minimising impact on existing site ecology	2	2	Ecologist report confirms small negative change to ecological value
	LE04	Enhancing site ecology	2	1	Ecologist recommendations to enhance ecology are implemented.

	LE05	Long term impact on biodiversity	2	2	Ecologist to confirm all legislation complied with during construction; Landscape and Habitat Management Plan; Adopt 4 of Ecologist's additional measures as recommended
Pollution	POL01	Impact of Refrigerants	5	2	Pre-requisite Impact of refrigerant Leak detection
	POL02	NOx Emissions	3	3	Nox Emissions of Heating & Cooling Sources
	POL03	Surface water run-off	5	4	Flood Risk Assessment; Peak rate run off volume to be met
	POL04	Reduction of Night Time Light Pollution	1	1	External Lighting Strategy & Controls to follow LLP guidance
	POL05	Reduction of noise pollution	1	1	Noise Impact Assessment

Figure 5: Table showing the targeted credits of the development

5. CONCLUSIONS

Energist UK has carried out a Pre-Assessment to determine the viable BREEAM rating that can be achieved by the proposed school.

The Pre-Assessment determined that the development attains the minimum standard credits required at BREEAM rating Very Good and has the potential to achieve an overall score of 68.3%.

The applicant demonstrates commitment to attain a Very Good BREEAM rating can be achieved with a score of 68.30%, meeting the requirements of Reading Borough Council.

BREEAM Section	Credits available	Credits achieved	% of credits achieved	Section weighting fully fitted) %	Section score (%)
Management	21	13	61.90%	12.00%	7.42%
Health and wellbeing	18	12	66.67%	15.00%	10.00%
Energy	22	12	54.55%	15.00%	8.18%
Transport	7	6	85.71%	9.00%	7.71%
Water	9	6	66.67%	7.00%	4.66%
Materials	14	9	64.29%	13.5%	8.67%
Waste	8	4	50.00%	8.50%	4.25%
Land use and Ecology	10	8	80.00%	10.00%	8.00%
Pollution	13	11	84.62%	10.00%	8.46%
Innovation	10	1	10.00%	N/A	1.00%
Final BREEAM Score					68.30%
BREEAM rating					Very Good

Figure 6: Calculations for score

6. NEXT STEPS

6.1 Design Stage Assessment

The first stage of the BREEAM assessment is carried out on the detailed design. It is possible to undertake the design stage assessment during the period up to the issue of tender documents.

However, the evidence base is required to demonstrate that each credit can be awarded; therefore, to gain the most number of credits it is advisable to undertake the design stage assessment once the required information is available. For example, details of all the sanitary fittings are required to be specified to calculate the score for the water consumption efficiency under BREEAM.

When the Assessor is satisfied with the performance under the BREEAM for the design stage assessment a report will be submitted to BRE for an 'Interim' BREEAM certification. This report will contain some documentary evidence together with an 'audit trail' for all specification, clauses, drawings, letters and reports.

6.2 Post Construction Stage Assessment

This can be carried out on the completed development. As part of this process, the Assessor will collate evidence (either documentary, photographic, or site survey evidence) to demonstrate that the development has been built in accordance with the details given at the Design Stage. This assessment is called a Post Completion Review Assessment (PCR).

If changes have been made to the design following the design stage assessment (during the construction phase), that affects the BREEAM score, the Assessor will re-calculate the Final score. This may be different to the Interim score. When the Assessor is satisfied with the performance under the BREEAM Scheme, they will submit a report to BRE to receive a Final BREEAM Certification for the development

6.3 Ongoing Consultation & Monitoring

Although this report provides recommendations, specific requirements of BREEAM can easily be misinterpreted or excluded at design stage, particularly in relation to the numerous standards with which the client must demonstrate compliance (such as CIBSE / ILE standards etc.) and the requirement to consult with various specialists (such as LZC / renewables' consultants, ecologists, acousticians etc.). It is therefore recommended that the relevant, competent third parties are engaged throughout all design stages in order to ensure the development proceeds in a manner that complies with the relevant requirements.

7. APPENDICES

Appendix 1 – BRUKL Report

BRUKL Output Document

Compliance with England Building Regulations Part L 2013

HM Government

Project name

Green Park School
As designed

Date: Tue Mar 06 14:37:21 2018

Administrative information

Building Details
 Address: Green Park Village School, Longwater Avenue, READING, RG2

Certification tool
 Calculation engine: SBEM
 Calculation engine version: v5.3.a.0
 Interface to calculation engine: Design Database
 Interface to calculation engine version: v26.06.00.05
 BRUKL compliance check version: v5.3.a.0

Owner Details
 Name: Berkley Homes (Western) Ltd
 Telephone number: na
 Address: 200 Longwater Avenue, Reading, RG2 6GB

Certifier details
 Name: Steve Hull
 Telephone number: 08458 386 387
 Address: Energist UK, College Farm, Tetbury Road, Cirencester, GL7 6PY

Criterion 1: The calculated CO₂ emission rate for the building must not exceed the target

CO ₂ emission rate from the notional building, kgCO ₂ /m ² .annum	23.6
Target CO ₂ emission rate (TER), kgCO ₂ /m ² .annum	23.6
Building CO ₂ emission rate (BER), kgCO ₂ /m ² .annum	20
Are emissions from the building less than or equal to the target?	BER ≤ TER
Are as built details the same as used in the BER calculations?	Separate submission

Criterion 2: The performance of the building fabric and fixed building services should achieve reasonable overall standards of energy efficiency

Values which do not achieve the standards in the Non-Domestic Building Services Compliance Guide and Part L are displayed in red.

Building fabric

Element	U _{a-Limit}	U _{a-Calc}	U _{i-Calc}	Surface where the maximum value occurs [*]
Wall**	0.35	0.15	0.15	CIRC FF Wall 1
Floor	0.25	0.1	0.1	CIRC1 GF Exposed Floor 1
Roof	0.25	0.1	0.1	CIRC FF Exposed Roof 1
Windows***, roof windows, and rooflights	2.2	1.4	1.4	CIRC FF Window 1
Personnel doors	2.2	2.2	2.2	CIRC FF Door 1 (Personnel Door)
Vehicle access & similar large doors	1.5	-	-	"No external vehicle access doors"
High usage entrance doors	3.5	-	-	"No external high usage entrance doors"

U_{a-Limit} = Limiting area-weighted average U-values [W/(m²K)]
 U_{a-Calc} = Calculated area-weighted average U-values [W/(m²K)]
 U_{i-Calc} = Calculated maximum individual element U-values [W/(m²K)]

* There might be more than one surface where the maximum U-value occurs.
 ** Automatic U-value check by the tool does not apply to curtain walls whose limiting standard is similar to that for windows.
 *** Display windows and similar glazing are excluded from the U-value check.
 N.B.: Neither roof ventilators (inc. smoke vents) nor swimming pool basins are modelled or checked against the limiting standards by the tool.

Air Permeability	Worst acceptable standard	This building
m ³ /(h.m ²) at 50 Pa	10	3

Technical Data Sheet (Actual vs. Notional Building)

Building Global Parameters			Building Use	
	Actual	Notional	% Area	Building Type
Area [m ²]	2341.5	2341.5		A1/A2 Retail/Financial and Professional services
External area [m ²]	3830.3	3830.3		A3/A4/A5 Restaurants and Cafes/Drinking Est./Takeaways
Weather	SWI	SWI		B1 Offices and Workshop businesses
Infiltration [m ³ /hm ² @ 50Pa]	3	4		B2 to B7 General Industrial and Special Industrial Groups
Average conductance [W/K]	1113.92	1405.18		B8 Storage or Distribution
Average U-value [W/m ² K]	0.29	0.37		C1 Hotels
Alpha value* [%]	21.64	15.2		C2 Residential Institutions: Hospitals and Care Homes
* Percentage of the building's average heat transfer coefficient which is due to thermal bridging				C2 Residential Institutions: Residential schools
				C2 Residential Institutions: Universities and colleges
				C2A Secure Residential Institutions
				Residential spaces
				D1 Non-residential Institutions: Community/Day Centre
				D1 Non-residential Institutions: Libraries, Museums, and Galleries
			100	D1 Non-residential Institutions: Education
				D1 Non-residential Institutions: Primary Health Care Building
				D1 Non-residential Institutions: Crown and County Courts
				D2 General Assembly and Leisure, Night Clubs, and Theatres
				Others: Passenger terminals
				Others: Emergency services
				Others: Miscellaneous 24hr activities
				Others: Car Parks 24 hrs
				Others: Stand alone utility block

Energy Consumption by End Use [kWh/m²]

	Actual	Notional
Heating	18.53	21.97
Cooling	0	0
Auxiliary	1.08	1
Lighting	11.24	12.08
Hot water	54.15	58.79
Equipment*	15.54	15.54
TOTAL**	85	91.85

* Energy used by equipment does not count towards the total for calculating emissions.
** Total is net of any electrical energy displaced by CHP generators, if applicable.

Energy Production by Technology [kWh/m²]

	Actual	Notional
Photovoltaic systems	4	0
Wind turbines	0	0
CHP generators	0	0
Solar thermal systems	0	0

Energy & CO₂ Emissions Summary

	Actual	Notional
Heating + cooling demand [MJ/m ²]	123.59	131.61
Primary energy* [kWh/m ²]	126.49	135.25
Total emissions [kg/m ²]	20	23.6

* Primary energy is net of any electrical energy displaced by CHP generators, if applicable.

Appendix 2 – Reading Core Strategy 2015: Summary

Sustainable Development and Climate Change

Reading Core Strategy 2015: Summary Sustainable Development and Climate Change

The planning system has a key role in implementing the Government's Strategy for Sustainable Development. The strategy revolves around several guiding principles:

- Living within environmental limits;
- Ensuring a strong, healthy and just society;
- Achieving a sustainable economy;
- Promoting good governance; and
- Using sound science responsibly. Four priority areas for action are identified in the Strategy:
- Sustainable consumption and production;
- Climate change;
- Natural resource protection; and
- Sustainable communities.

On climate change, the Government's strategy states that: scientific evidence points to the release of greenhouse gases, such as carbon dioxide and methane, into the atmosphere by human activity as the primary cause of climatic change. We will seek to secure a profound change in the way we generate and use energy, and in other activities that release these gases".

Sustainable development (including climate change) is a central consideration in the preparation of the Reading Borough Local Development Framework. The framework takes forward the principles of sustainable development. The Council is applying sustainability appraisal to the emerging documents, to ensure that economic, social and environmental issues are appraised holistically.

Improving Quality of Life and Creating Sustainable Communities

Improving quality of life and creating sustainable communities is an inherent part of sustainable development. Sustainable Communities means putting sustainable development into practice. "Sustainable Communities must combine social inclusion, homes, jobs, services, infrastructure and respect for the environment to create places where people will want to live and work now and in the future".⁸

Policy CS1 Sustainable Development

Living within Environmental Limits (Environmental Objectives)

1. Use energy, water, minerals and other natural resources appropriately, efficiently and with care.
2. Minimise the consumption of, and reduce damage to, undeveloped land.
3. Minimise the generation of waste and promote more sustainable approaches to waste management.
4. Minimise air, water, soil/ ground and noise pollution and address the factors that contribute to climate change, recognising the heightened knowledge of the severity of climate change related impacts.
5. Manage the risk of flooding and minimise detrimental impacts upon drainage.
6. Value, protect and enhance the amount and diversity of habitat and wildlife and other contributors to natural diversity.

7. Create, enhance and maintain safer, cleaner and greener environments, which include diverse and distinctive places, spaces and buildings.
8. Create buildings and environments that work well, look well, wear well and are easily maintained.
9. Value, protect and, where appropriate, enhance the historic environment.

Ensuring a Strong, Healthy and Just Society

(Social & Economic Objectives)

1. Protect and promote human health and well-being through healthy lifestyles and healthcare provision.
2. Promote safer and stronger communities through measures to reduce crime and the fear of crime and enhance community cohesion.
3. Provide high quality housing of a type and cost appropriate to the needs of the area.
4. Reduce the need for travel and transport particularly by car or lorry while providing good physical access for all to services, facilities and other people.
5. Value the social and cultural diversity and the local distinctiveness of communities.
6. Ensure accessible opportunities for all to engage in culture, leisure and recreational activity, particularly open space and water space.
7. Provide employment opportunities for all and support a successful, balanced local economy that meets the needs of the area.
8. Maximise access for all to the necessary education, skills and knowledge to play a full role in society.
9. Provide opportunities for all to participate fully in society including local democracy and decision-making processes.

CS1 Sustainable Construction and Design

The key aims of the Community Strategy relevant to this section are:

- To encourage best practice in sustainable building design and construction;
- To ensure that new development is sustainable and well designed, and incorporates measures that make a positive contribution to the environment; and
- To limit and respond to the impacts on climate change by reducing energy consumption and encouraging the use of renewable sources of energy.

To meet these requirements:

- All new housing is required to meet the most up to date Eco- Homes 'Very Good' as a minimum standard, and all new commercial developments are required to meet the most up to date BREEAM 'Very Good' as a minimum standard;
- On larger developments of more than 10 dwellings or 1,000 m² of floorspace, ensure that 50% of the provision meets the most up to date Eco-Homes and BREEAM 'Excellent' standards;
- All new developments maximise the use of energy efficiency and energy conservation measures in their design, layout and orientation to reduce overall energy demand;
- All developments of more than 10 dwellings or 1000m² floorspace incorporate on-site generation of energy from renewable sources and energy efficient design measures (including the use of CHP where appropriate) to off-set at least 20% of predicted carbon dioxide emissions from the estimated energy usage of the completed and occupied development;
- All developments reduce mains water use and demonstrate that water conservation measures are

Policy CS2: Waste Minimisation

Development should demonstrate measures to minimise the generation of waste in the construction, use and life of buildings and promote more sustainable approaches to waste management, including

the reuse and recycling of construction waste and the promotion of layouts and designs that provide adequate space to facilitate waste storage, reuse, recycling and composting

Targets:

Targets for Construction and Demolition waste:	2010	2015	2020
Recycling	50%	50%	60%
Reuse	33%	36%	28%
Landfill	17%	14%	12%

Source: 'Update of the Model for Future Waste Management Capacity needs in the South East: Final Report', ERM for SEERA, September 2005.

Policy CS3: Social Inclusion and Diversity

Major developments should demonstrate measures to enhance social inclusion in terms of access to housing, employment, services, community facilities, leisure, health, education, and other services and facilities. Development should recognise and take account of the social and cultural diversity of the area in which it is located, and contribute to the enhancement of local distinctiveness.

All members of the population should be provided with access to good quality health, education and other social facilities. New housing development will be co-located with a range of accessible facilities, or appropriately planned and located to ensure that access to such facilities is provided. Public involvement in planning will be encouraged, including participation by a range of representation groups.

Targets:

- Improvements in level of relative accessibility to a range of services and facilities;
- Provision of a range of services and facilities to meet the diverse needs of stakeholders
- Meaningful community consultation processes, which include the involvement of a wide cross-section of respondents

Policy CS4: Accessibility and the Intensity of Development

The scale and density of development within the Borough will be related to its level of accessibility by walking, cycling and public transport to a range of services and facilities. Sites will be assessed in terms of their level of accessibility to a defined district or local centre with a good range of facilities by pedestrian routes, and to a bus stop served by a strategic bus service 18. Unless it can be demonstrated that the accessibility of a site is to be significantly upgraded, for example, by providing high quality pedestrian routes or providing access to good public transport services, any new development must be at a scale, density and intensity appropriate to that level of accessibility as set out in other policies in this document, other Development Plan Documents or Supplementary Planning Documents.

Targets:

- Improvements in the level of accessibility to a range of local services and facilities, bringing about a reduction in vehicular usage and a long-term reduction in vehicular reliance

Policy CS5: Inclusive Access

All buildings should be located, sited and designed to provide suitable access to, into and within, its facilities, for all potential users, including disabled people, so that they can use them safely and easily.

Policy CS7: Design and the Public Realm - Design and Access Statement

All development must be of high design quality that maintains and enhances the character and appearance of the area of Reading in which it is located. The various components of development form, including:

- Layout: urban structure and urban grain;
- Landscape;
- Density and mix;
- Scale: height and massing; and
- Architectural detail and materials.

All developments will be assessed to ensure that the development proposed makes a positive contribution to the following urban design objectives:

- Character - a place with its own identity and sense of place
- Continuity and enclosure
- Quality of the public realm
- Ease of movement and permeability
- Legibility - clear image and easy to understand
- Adaptability – capable of adaptation over time
- Diversity – meets a wide range of needs.

Developments will also be assessed to ensure that they:

- Respond positively to their local context and create or reinforce local character and distinctiveness, including protecting and enhancing the historic environment of the Borough and providing value to the public realm;
- Create safe and accessible environments where crime and disorder or fear of crime does not undermine quality of life or community cohesion;
- Address the needs of all in society and are accessible, usable and easy to understand by them; and
- Are visually attractive as a result of good high quality built forms and spaces, the inclusion of public art and appropriate materials and landscaping.

Policy CS8: Water spaces Design & Access Statement

Reading's water spaces will be protected, so that they can continue to contribute to local and regional biodiversity and ecology, local character and visual amenity, and the provision of accessible leisure and recreational opportunities.

Policy CS9: Infrastructure, Services, Resources and Amenities

Proposals for development will not be permitted unless the local planning authority is satisfied that infrastructure, services, resources, amenities or other assets lost or impacted upon as a result of the development or made necessary by the development will be provided or re-provided at the appropriate time, in order to ensure that the development is both sustainable and contributes to the proper planning of an area in accordance with relevant planning policies. Such contributions may be pooled, in order to allow necessary infrastructure to be secured in a fair and equitable way.

Appendix 3 - Glossary of terms

Accredited Energy Assessor: A person registered with an accredited energy assessment scheme provider. The scheme provider will be licensed by Communities and Local Government to accredit competent persons to assess the CO₂ emission rates of domestic buildings for the purposes of demonstrating compliance with *Building Regulations*.

Actual Case CO₂ Emissions: CO₂ emissions from the dwelling (Kg CO₂/m²/year) accounting for the input from specified/installed low and zero carbon technologies. The standard case dwelling model must be used as the basis for the calculation of actual case emissions. However, where eligible low or zero carbon technologies are specified in the dwelling they can replace the standard systems assumptions from table Cat 1.2 for the purposes of the actual case calculation.

Actual case CO2 emissions must be calculated in accordance with the methodology defined in table Cat 1.3.

(AD F) Approved Document F1: The Building Regulations for England and Wales Approved Document F1: Means of Ventilation (2010 Edition).

(AD L1A) Approved Document L1A: The Building Regulations for England and Wales Approved Document L1A: Conservation of Fuel and Power in New Dwellings (2010 Edition).

(ALO) Architectural Liaison Officer: This is the same as the Crime Prevention Design Advisor (see definition below) and is the title given to the same role in some police forces. Taken from www.securedbydesign.com

Angle of visible sky: The angle of visible sky α is the angle subtended, in the vertical plane normal to the window, by the visible sky from the centre of the window

Annual flood probability: The estimated probability of a flood of given magnitude occurring or being exceeded in any year. Expressed as a 1 in x year event. This is the equivalent to 1-in-x, 1:x or x% chance of a flood event occurring in any one year.

Annual flow rate probability: The estimated probability of a flow rate of given magnitude occurring or being exceeded in any year. Expressed as a 1 in x year event. This is the equivalent to 1-in-x, 1:x or x % chance of the flow rate being exceeded in any one year.

Appropriately qualified professional: A professional or team of professionals with the skills and experience to champion the use of SUDs within the overall design of the development at an early stage.

Approved Document E (AD E): The Building Regulations for England and Wales Approved Document E: Resistance to the Passage of Sound, 2003 edition incorporating 2004 amendments.

Average daylight factor: The average daylight factor is the average indoor illuminance (from daylight) on the working plane within a room, expressed as a percentage of the simultaneous outdoor illuminance on a horizontal plane under an unobstructed CIE 'standard overcast sky'.

Basic building elements: Basic building elements are defined as follows; *Frame*, Ground floor, Upper floors, Roof, External walls, Internal walls, Foundation/substructure, Staircase (includes the tread, risers and stringers).

BES 6001:2008 Framework Standard for Responsible Sourcing of Construction Products: BES 6001:2008 is a BRE Global standard that provides a framework for the assessment of responsible sourcing schemes and provides a route to certification of construction products.

Blowing agents: Any material used to produce a cellular structure in either a plastic or other foam insulation used in either manufacture or installation.

Boiler class: An indication of a boiler's NOX emissions. Boilers are classified on a scale of 1 to 5, with 1 indicating high NOX emissions through to relatively low NOX emissions for a class 5.

Brownfield site: Land which is or was occupied by a permanent structure, including the curtilage of the developed land and any associated hard surfaces.

Building Regulations: Building Regulations apply in England and Wales and promote standards for most aspects of a building's construction, including structure, fire safety, accessibility, sound insulation, drainage, energy efficiency, ventilation and electrical safety.

Building Envelope: For the purpose of issue Mat 1, the building envelope is defined as the overall superstructure of the particular building. Each building envelope may contain single or multiple dwellings.

Catchment: The area contributing surface water flow to a drainage point or a point on a watercourse. It can be divided into sub-catchments

Central rainwater collection system: A system which will collect and store rainwater for use across the development. This could be a large storage tank or other form of surface water system.

Chain of custody (CoC): This is a process used to maintain and document the chronological history of the evidence/path for timber products from forests to consumers.

Compliant test body: Those organisations or individuals having UKAS accreditation or accredited by a European equivalent of UKAS, as well as organisations or individuals registered with the Association of Noise Consultants (ANC) Registration Scheme.

Composting: Composting is a natural process which converts organic waste into an earth-like mass by means of bacteria and micro-organisms. The composting process is also supported by larvae, wood lice, beetles, worms and other such creatures.

Considerate Constructors Scheme (CCS): The Considerate Constructors Scheme is a UK certification scheme that encourages the considerate management of construction sites.

Construction zone: The construction zone includes any land used for buildings, hard-standing, landscaping, site access or where construction work is carried out (or land is being disturbed in any other way), plus a 3m boundary in either direction around these areas. It also includes any areas used for temporary site storage and buildings. If it is not known exactly where buildings, hard-standing, site access and temporary storage and buildings will be located, it must be assumed that the construction zone is the development site.

Contaminated land: A site can be defined as contaminated land where the level of site contamination prevents development unless decontamination is carried out.

Control systems (lighting): A method for controlling the external lighting to ensure that it will not operate unnecessarily, e.g. during daylight hours or when a space is unoccupied. Control systems that can be considered are passive infra red (PIR), 'dusk to dawn' daylight sensors and time switches.

(CPDA) Crime Prevention Design Advisor: “The Crime Prevention Design Advisor (CPDA) is a specialist crime prevention officer, trained at the Home Office Crime Reduction College, who deals with crime risk and designing out crime advice for the built environment. In addition to physical security measures the officer will consider defensible space, access, crime and movement generators all of which can contribute to a reduction in crime and disorder.” Taken from www.securedbydesign.com

Dedicated energy efficient light fittings: Fittings that comprise the lamp, base, control gear and an appropriate housing, reflector, shade or diffuser. The fitting must be dedicated in that it must be capable of only accepting lamps having a luminous efficacy greater than 40 lumens per circuit watt. A light fitting may contain one or more lamps.

Design flood level: The maximum estimated water level during the design storm event. A site’s design flood level can be determined through known historical data or modelled for the specific site.

(DER) Dwelling Emission Rate: The DER is the estimated CO₂ emissions per m² per year (KgCO₂/m²/year) for the dwelling as designed. It accounts for energy used in heating, fixed cooling, hot water and lighting.

Direct Supply: The carbon benefit of energy generated by low or zero carbon technologies can only be allocated to dwellings that are directly supplied by the installation via dedicated supplies.

Discharge point: The point of discharge into watercourses and sewers (see definition of ‘Watercourses and sewers’)

Dry NO_x: The NO_x emissions (mg/kWh) resulting from the combustion of a fuel at zero per cent excess oxygen levels. If electricity is sourced from the national grid, the associate Dry NO_x emissions are approximately 1200 mg/kWh.

Ecological features: Ecological features are defined in Checklist Eco 1 – Land of Low Ecological Value, and include trees, hedges, ponds, streams, rivers, marshes, wetlands, meadows, species-rich grassland, heath land and heather.

Environmental performance indicators (EPIs): When operated as part of a measuring-to-manage programme, environmental performance indicators allow companies to track how well they are doing and to identify opportunities to: save money and increase profits; use resources more efficiently; minimise waste (raw materials, product, energy, water, packaging, etc); and prevent pollution. For more information see <http://envirowise.wrap.org.uk>

EMS: Environmental management system.

EMAS: Eco-Management and Audit Scheme

(EPC) Energy Performance Certificate: This is a certificate that confirms the energy rating of the dwelling from A to G, where A is the most efficient and G is the least efficient.

EU Energy Efficiency Labelling Scheme: The EU energy label rates products from A (the most efficient) to G (the least efficient). For refrigeration, the scale now extends to A+++. It is a legal requirement for the label to be shown on all refrigeration and laundry appliances, dishwashers, electric ovens and light bulb packaging at point of sale.

(FEE) Fabric Energy Efficiency: Energy demand for space heating and cooling expressed in kilowatt-hours of energy demand per square metre per year (kWh/m²/year).

Finishing elements: For the purpose of this issue, the assessed finishing elements are defined as: Stairs, Windows, External and internal doors, Skirting, Panelling (including any other trim), Furniture, Fascias and any other significant use.

Flood probability: The estimated probability of a flood of given magnitude occurring or being exceeded in any specified time period. For example, the 100-year flood has a 1-in-100 or 1% chance of occurring in any given year.

Flood Risk Assessment (FRA): A study to assess the risk of a site flooding and the impact that any changes or development on the site will have on flood risk on the site and elsewhere. A flood risk assessment must be prepared according to good practice guidance as outlined in *PPS25 Development and Flood Risk: Practice Guide* (available from www.communities.gov.uk).

Flood storage: The temporary storage of excess run-off or river flow in ponds, basins, reservoirs or on a flood plain during a flood.

Global Warming Potential (GWP): Global Warming Potential is defined as the potential for global warming that a chemical has relative to 1 unit of carbon dioxide, the primary greenhouse gas. In determining the GWP of the blowing agent, the Intergovernmental Panel on Climate Change (IPCC) methodology using a 100-year Integrated Time Horizon (ITH) must be applied.

Green Dragon Environmental Standard® (Safon Amgylcheddol Y Ddraig Werdd®): A stepped standard used to accredit compliance with the Green Dragon environmental management scheme. Depending on the content of the EMS being assessed, a level of 1, 2, 3, 4 or 5 may be achieved. At level 4 and above, the Green Dragon Environmental Standard® can be used as evidence of a compliant EMS for small companies being considered under the Mat 2 and Mat 3 issues.

Greenfield run-off rate: The rate of run-off that would occur from the site in its undeveloped state.

The Green Guide to Specification: The Green Guide to Specification is an easy to use comprehensive reference website and electronic tool, providing guidance for specifiers, designers and their clients on the relative environmental impacts for a range of different building elemental specifications. The ratings within the Guide are based on Life Cycle Assessment, using the Environmental Profile Methodology.

Grey-water recycling: The appropriate collection, treatment and storage of used shower, bath and tap water for use instead of potable water in WCs and/or washing machines. Grey-water recycling systems normally collect used shower, bath and tap water and recycle it for toilet flushing.

Habitable space: A space typically occupied for more than 30 minutes during the day with safe access by a permanent stairway or other means of entrance which complies with the requirements of relevant national Building Regulations and where the space is 'finished' with floor, walls, lighting and electric sockets.

Net internal floor area: The area of all *habitable spaces*, including the area taken up by halls, stairwells, cupboards, internal partitions, habitable loft spaces and basements. This also includes common areas of blocks of flats and apartment buildings, including stairwells, circulation spaces and entrance lobbies.

Inclusive access and usability: The purpose of the Code is not to deliver purpose-designed wheelchair housing but rather inclusive general needs housing that caters for the widest possible segment of the population (including older people), and which can easily be adapted to meet the needs of wheelchair users.

Infiltration techniques: Techniques which allow the passage of water into the ground. Techniques used purely for infiltration purposes would typically involve soakaways or pervious paving. Other SuDS techniques, such as swales and filter strips, will also achieve a level of infiltration but, unlike soakaways, they also normally function as a conveyance mechanism for transporting run-off.

Key processes: These are the final major aspects of processing that are carried out. There may be a single process or multiple processes requiring assessment, depending on the end product.

Limiting discharge: The limiting discharge is based upon the calculated pre-development flow rate at a discharge point, but may be increased to 5 l/s.

Low and Zero Carbon Technologies: Technologies eligible to contribute to achieving the requirements of this issue must produce energy from renewable sources and meet all other ancillary requirements as defined by Directive 2009/28/EC of the European Parliament and of the Council of 23 April 2009 on the promotion of the use of energy from renewable sources and amending and subsequently repealing Directives 2001/77/EC and 2003/30/EC.

Low ecological value: Land defined as having low ecological value using Checklist Eco 1 or defined by a suitably qualified ecologist as having low or insignificant ecological value.

(MCS) Microgeneration Certification Scheme: The Microgeneration Certification Scheme (MCS) is an independent scheme that certifies microgeneration products and installers in accordance with consistent standards. It is designed to evaluate microgeneration products and installers against robust criteria, and provides consumers with an independent indication of the reliability of products, assurance that the installation will be carried out to the appropriate standard and a route for complaints should there be any issues.

MTCC: Malaysian Timber Certification Council.

Net CO2 Emissions: The annual dwelling CO2 emissions (KgCO2/m2/year) from space heating and cooling, water heating, ventilation and lighting, and those associated with appliances and cooking.

No-sky line: The no-sky line divides those areas of the working plane which can receive direct light from the sky, from those which cannot. It is important as it indicates how good the distribution of daylight is in a room. Areas beyond the no-sky line will generally look gloomy.

Non-native invasive species: These are non-indigenous species (e.g. plants or animals) that adversely affect the habitats they invade economically, environmentally or ecologically. For the purposes of the Code, this currently includes only Japanese Knotweed and Giant Hogweed. Further information on their control and disposal and how this fits into the legislative framework relating to such species can be obtained from DEFRA.

Peak rate of run-off : Referred to as Q_p [m³/sec], this is the highest rate of flow from a defined catchment area assuming that rainfall is uniformly distributed over the drainage area, considering the entire drainage area as a single unit and estimation of flow at the most downstream point only.

PEFC: Programme for the Endorsement of Forest Certification Schemes.

Post-consumer waste stream: Waste material generated by households or by commercial, industrial and institutional facilities in their role as end-users of the product, which can no longer be used for its intended purpose. This includes returns of material from the distribution chain.

Potable water: Drinking quality water that is taken from a connection to the mains water supply in the dwelling, which may be from the public water supply or a private supply such as from groundwater via a borehole.

Pre-consumer waste stream: Waste material generated during manufacturing processes. Excluded is reutilisation of materials such as rework, regrind or scrap generated in a process and capable of being reclaimed within the same process that generated it.

Probability of flooding – Low (Zone 1): Low annual probability of flooding is an area where the chance of both river and sea flooding each year is <0.1% (1 in 1000) or less.

Probability of flooding – Medium (Zone 2): An area where the chance of river flooding in any year is 1% (1 in 100) or less but greater than 0.1% (1 in 1000), and the chance of flooding from the sea is 0.5% – 0.1% (between 1 in 200 and 1 in 1000).

Probability of flooding – High (Zone 3a): An area where the chance of river flooding in any year is >1% (1 in 100) and the chance of flooding from the sea is >0.5% (1 in 200) or greater.

Probability of flooding – Functional flood plan (zone 3b): The land where water flows or is stored in times of flood.

Qbar: An estimation of the mean annual flood flow rate from a catchment (see Report IH124 *Flood estimations for small catchments*).

Rainfall intensity: Depth of rain falling in a period of time, e.g. mm/hour, sometimes given in l/s/m².

Rainwater discharge: Rainwater discharge is the rainwater which flows from the development site to watercourses and sewers. It is also referred to as run-off.

Residual risk: The risk which remains after all risk avoidance, reduction and mitigation measures have been implemented.

Robust details: Robust details (RDs) are construction solutions that provide an alternative to pre-completion sound insulation testing as a method of complying with Requirement E1 of Approved Document E (2003 Edition) of the Building Regulations (England and Wales). Robust details must be approved by Robust Details Ltd (RDL) and all development sites must be registered with RDL and built in accordance with the RD specification.

Run-off rate: The rate of flow of water from a surface.

(SAP) Standard Assessment Procedure for Energy Rating of Dwellings: The Government's approved methodology for assessing the energy performance of new dwellings. The current version is SAP 2009 version 9.90, dated March 2010, rev October 2010. The procedure accounts for energy used in space heating and cooling, hot water provision and fixed lighting.

(SBD) Secured by Design: This is a police initiative to encourage the building industry to adopt crime prevention measures in the design of developments to assist in reducing the opportunity for, and fear of, crime, creating a safer and more secure environment. Secured by Design is owned by the Association of Chief Police Officers (ACPO), and has the support of the Home Office Crime Reduction & Community Safety Group and the Planning Section of the Department for Communities and Local Government.

Security lighting: Security lighting is provided to protect property. There are two types of security lighting commonly used in dwellings – high wattage intruder lights that are operated via PIR sensors which only switch on for a short time, and low wattage lighting that is controlled by time switches and daylight sensors.

SFI: Sustainable Forestry Initiative.

Site Inspection Report: A report prepared by the Code assessor during a post construction stage assessment and provided as evidence with the assessment.

Site Waste Management Plan Regulations 2008: Powers were included in the Clean Neighbourhoods and Environment Act 2005 for regulations requiring a SWMP for works involving construction or demolition waste. The regulations, which came into force in April 2008, mean that any construction project in England costing over £300,000 will require an SWMP. See www.environment-agency.gov.uk/business and www.defra.gov.uk.

Soakaway: Underground structure designed to permit infiltration into permeable/slightly permeable ground. They can be grouped and linked together to drain large areas including highways.

Space lighting: The normal lighting required to illuminate a space when in use. It can be used outside the entrance to the home, in outbuildings such as garages and cycle stores, and for external spaces such as paths, patios, decks, porches, steps and verandas.

Staggered dwellings: These are dwellings on several levels which are of unequal floor area. For example, a dwelling with a first floor area greater than the ground floor area which may overhang the ground floor.

Standard Case CO2 Emissions: CO2 emissions from the dwelling (Kg CO2/m2/year) assuming a standard systems specification, based on the Domestic Building Services Compliance Guide 2010 Edition.

Standard case CO2 emissions create the baseline against which the contribution of low and zero carbon technologies is measured. They represent the common scenario where a gas boiler is installed and ensure a 'level playing field' to allow a fair comparison of the contribution of low and zero carbon technologies, regardless of the carbon intensity of the actual heating fuel specified.

Statutory safety lighting: Safety lighting is usually provided in multi-residential buildings such as blocks of flats to illuminate stairwells and exit routes when the main lighting system fails. Its design is specified by regulation (BS 5266) and is therefore outside the scope of the Code.

SuDS: As defined in the SuDS manual, sustainable drainage systems are an approach to surface water management that combines a sequence of management practices and control structures designed to drain surface water in a more sustainable fashion than some conventional techniques.

Suitably qualified ecologist: A suitably qualified ecologist is defined as an individual who: Holds a degree or equivalent qualification (e.g. N/SVQ Level 5) in ecology or a related subject

Is a practising ecologist, with a minimum of three years' relevant experience (within the last five years). Such experience must clearly demonstrate a practical understanding of factors affecting ecology in relation to construction and the built environment, including acting in an advisory capacity to provide recommendations for ecological protection, enhancement and mitigation measures. Examples of relevant experience are ecological impact assessments, Phase 1 and 2 habitat surveys, and habitat restoration

Is covered by a professional code of conduct and subject to peer review.

Supply Chain EMS: This covers all the major aspects of processing and extraction involved in the supply chain for the end product. Note: *Recycled materials* are not required to demonstrate a supply chain EMS. If EMS certification is provided for the key processes for recycled materials, this is assumed by default.

(TER) Target Emission Rate: The target emission rate is the maximum allowable CO2 emissions per m2 (KgCO2/m2/year) arising from energy used in heating, cooling, hot water and lighting which would demonstrate compliance with Criterion 1 of AD L1A.

The TER is calculated using the SAP methodology according to the requirements defined in AD L1A.

Treatment (water): Improving the quality of water by physical, chemical and/or biological means.

Verified ecological report: A verified ecological report is a report carried out by an ecologist who does not fully meet the requirements of a suitably qualified ecologist.

Volume of run-off: The volume of run-off that is generated by rainfall occurring on the site. This is typically measured in cubic metres.

Working plane: The working plane is a notional surface, typically at about desk or table height, at which daylight factor or the 'no-sky line' is calculated or plotted. For the calculations required under the Hea 1 issue, it is at 0.85 m above the floor.