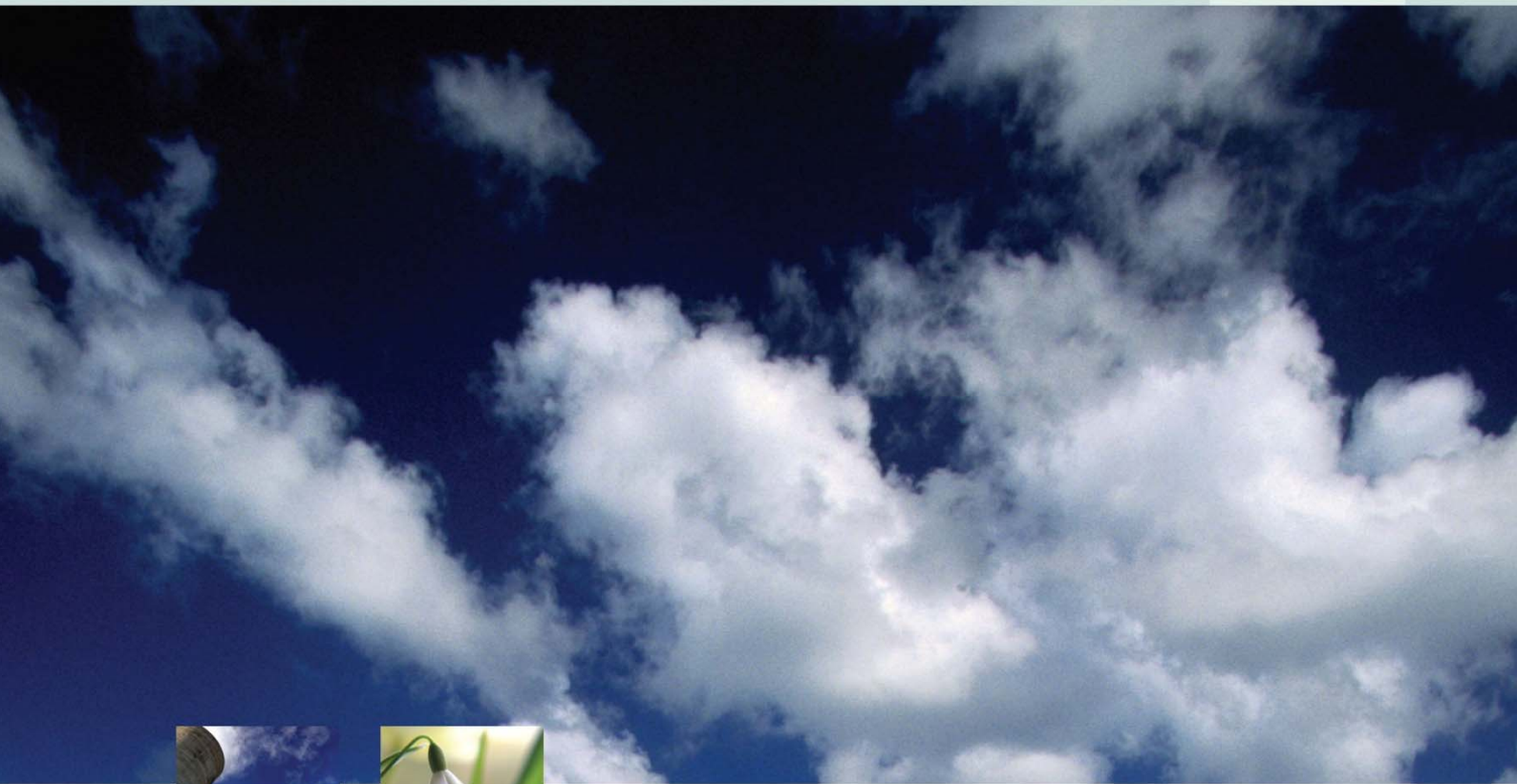




BREEAM Pre-Assessment

Proposed Residential Development
Gas Works Road, READING

Prepared for:
Galliard Homes

Date:
March 2016

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EXECUTIVE SUMMARY

The Building Research Establishments Environmental Assessment Method (BREEAM) Scheme is the national standard for assessing the sustainability of new construction developments. BREEAM aims to differentiate between developments with higher environmental performance by providing a sustainability rating.

Galliard Homes are proposing the refurbishment and redevelopment of land on Gas Works Road in Reading. The proposed redevelopment of the site has been pre-assessed against the relevant BREEAM Domestic Refurbishment protocols to demonstrate the overall sustainability credentials. This assessment has been carried out in order to provide the design team with an indication of likely performance given current design intent and an understanding of the sustainability considerations that will need to be taken into account in the developing detailed design stages.

This report has been prepared by Sol Environment Ltd in cooperation with the applicant and in accordance with Core Strategy Policy CS1: Sustainable Construction and Design of Reading Borough Council Local Development Framework Core Strategy (Adopted January 2008 with alterations Adopted January 2015). Policy CS1 requires

- 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 floor space, ensure that 50% of the provision meets the most up to date Eco-Homes and BREEAM 'Excellent' standards;

The report will be provided to the design team to assist in meeting a BREEAM 'Excellent' rating for 50% of the dwellings and a BREEAM 'Very Good' rating for the remaining dwellings.

The development has been pre-assessed against the *BREEAM Domestic Refurbishment 2014* tool.

The Proposed Development

The proposed development shall incorporate the refurbishment and expansion of 2 derelict masonry warehouse buildings to provide 34 new residential units – 17 will be located within the envelope of the existing buildings and 17 will be new build either above or adjacent to the existing buildings and associated landscaping. The development will comprise of the following elements (refer to Figure ES1);

- The refurbishment of an existing smaller building to the south of the site housing a basement cycle store and energy centre and 6 flats across 3 levels;
- The refurbishment of an existing larger building adjacent to the River Kennett housing the remaining 28 flats across 6 levels; and
- Associated landscaping.

This BREEAM Pre-assessment was informed by correspondence with the design team in addition to the following documentary sources;

- Architectural documentation – Prepared by e3 Design

The design team are committed to achieving a minimum **BREEAM Very Good** rating for 50% of the dwellings and a minimum of **BREEAM Excellent** rating for the other 50%. Due to the current stage of the development, where detailed proposals are yet to be developed, the design team worked on the principal that the credits awarded within this assessment would be only *likely* to be achieved by the final design.



Figure ES1 Proposed Site Layout

Findings

The proposed dwellings are likely to achieve either a **BREEAM 'Very Good'** rating or **BREEAM 'Excellent'** rating, given current design intent: the **'Very Good' Dwellings** are likely to achieve a total overall score of 64.52% and the **'Excellent' Dwellings** are likely to achieve a total overall score of 74.76%.

Graphical summary of findings

The figures below show a summary of the percentage of available credits which are likely to be achieved in each section (land use & ecology, management, etc), given current design intent, for the proposed development.

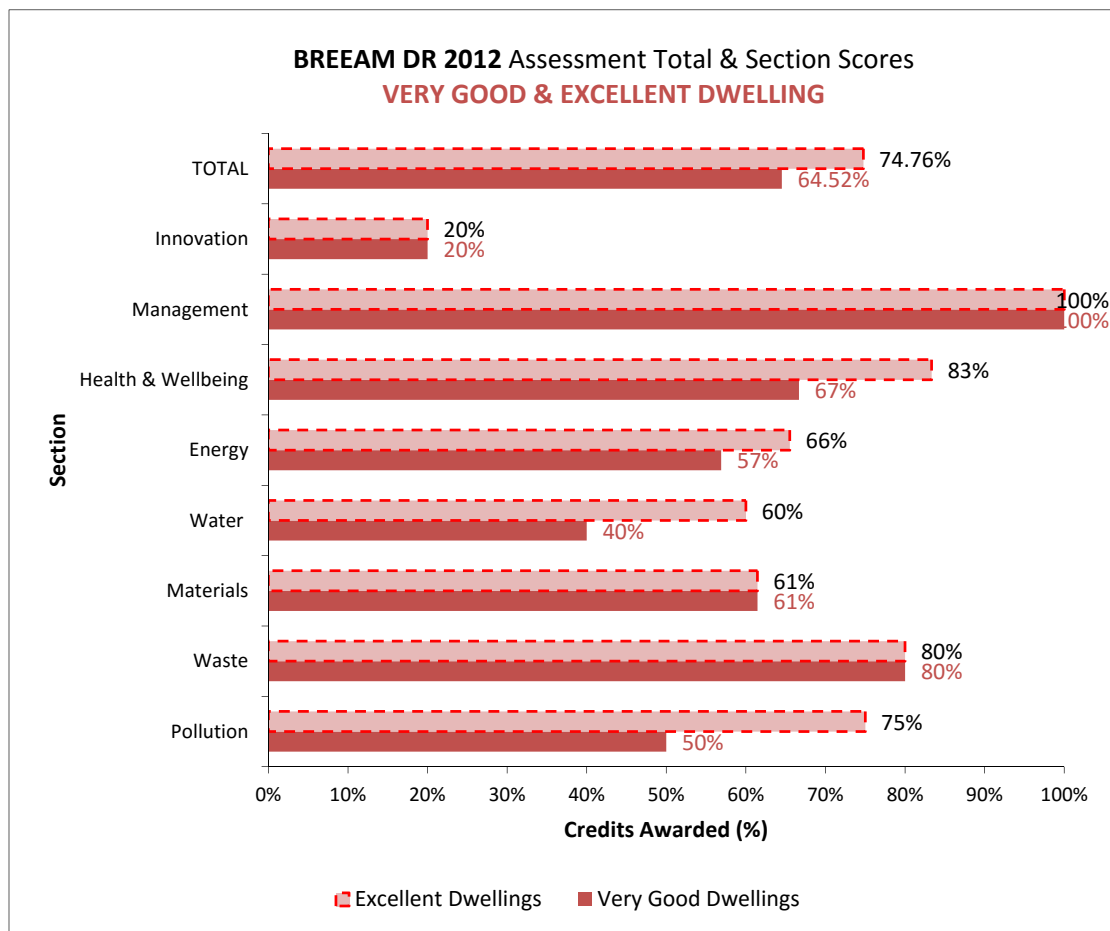


Figure ES2: Predicted Percentage of the Total Score Targeted and a Breakdown of the Percentage of Credits Awarded in each Section for the development. The potentially improved score, taking in consideration opportunities nominated in Section 6, is shown dashed.

Summary

Figure ES2 shows that the proposals perform well in the following environmental categories;

- **Management:** Best practice site management measures such as CCS, ecological protection and handover procedures will be implemented. Home user guide will be developed to assist the building user to live sustainably.
- **Waste:** The implementing a site-wide waste management plan (SWMP) to reduce refurbishment waste is proposed with best practice benchmarks to reduce waste and encourage the diversion of waste from landfill during the construction stage; and appropriate recycling facilities will be provided to encourage recycling once the dwellings are occupied.
- **Health and Wellbeing:** The design will aim to improve the quality of life in homes by recognising refurbishments that encourage a healthy and safe internal environment for occupants. Proposed measures include maximising the use of natural daylighting, high performance sound insulation and good ventilation

Irrespective of current predicted performance, there remains some further limited opportunity to increase the BREEAM score. These improvements mainly lie in the areas of pollution, transport and materials. These opportunities are identified in Section 5 of this report.

As this pre-assessment has been undertaken in the early stages of design, much of the evidence base required to demonstrate achievement of credits is yet to be finalised. It is possible that due to changes in the design or a lack of necessary evidence at the later design stages, there may be credits which cannot be awarded at the time the certification assessments are carried out. The project team should ensure that the requirement to demonstrate achievement of sufficient credits is fully taken into account during design development and construction.

- Section 6 of this report provides details outlining the Design and Post Construction Stages of BREEAM certification;
- Appendix 1 provides details of the evidence needed from the design team to support the certification process; and
- Appendix 2 provides a glossary of the all of the technical terms used within the body of this report.

1. INTRODUCTION: BREEAM

1.1 Background

The Building Research Establishments 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 Domestic Refurbishment 2014 Scheme is designed to evolve with increasingly tightening Building Regulations, and the development of technology and innovations, with the most recent version of BREEAM released by BRE Global in 2014, placing a greater emphasis on overall life cycle efficiencies and stakeholder participation.

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

- Management;
- Health & Wellbeing;
- Energy;
- Water;
- Materials;
- Waste; and
- Pollution.

A further 'Innovations' section is provided to award developments that go above and beyond 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.

1.2 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 (see Table 1.1). The Weighting Factors reflect the relative importance of each of the categories covered under BREEAM.

Table 1.1: BREEAM DR 2014 Issue Weighting Factors		
Environmental Impact Categories	No of Credits in Category	Environmental Weighting Factor (as % of total possible points score available)
Category 1 – Management	11	12%
Category 2 – Health & Wellbeing	12	17%
Category 3 – Energy	29	43%
Category 5 – Water	5	11%
Category 6 – Materials	45	8%
Category 7 – Waste	5	3%
Category 9 – Pollution	8	6%
Total	115	100%

The BREEAM scoring runs from Unclassified to Outstanding, as depicted in Table 1.2 below.

Table 1.2: BREEAM Performance Ratings		
BREEAM Rating	Performance	Score
UNCLASSIFIED	Does not meet levels of standard good practice	<30
PASS	Top 75% of UK new non-domestic buildings (standard good practice)	30
GOOD	Top 50% of UK new non-domestic buildings (intermediate good practice)	45
VERY GOOD	Top 25% of UK new non-domestic buildings (advanced good practice)	55
EXCELLENT	Top 10% of UK new non-domestic buildings (best practice)	70
OUTSTANDING	Less than top 1% of UK new non-domestic buildings (innovator)	85

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 aspired.

1.3 Minimum Standards

Before a development can start to be awarded points under BREEAM it must achieve minimum standards in the following categories (mandatory credits noted for both BREEAM Excellent and BREEAM Very Good):

BREEAM Very Good mandatory criteria

- **Ene 02: Energy efficiency rating post-refurbishment – 2 credit.** To encourage high levels of energy efficiency in the refurbished dwellings, thus reducing CO2 emissions, running costs and fuel poverty. BREEAM Very Good level requires a minimum EER of 65.
- **Wat 01: Internal Water Use – One Credit.** To minimise the consumption of potable water in sanitary applications by encouraging the use of low water use fittings and water recycling systems. A calculated water consumption of ≤ 140 litres/person/day is required to achieve BREEAM Very Good.
- **Hea 05: Ventilation – One Credit.** To recognise and encourage a healthy internal environment through the provision of appropriate ventilation levels to provide fresh air and avoid problems associated with the build-up of pollutants and humidity levels without excessive heat loss. To achieve BREEAM Very Good the first credit must be achieved.
- **Hea 06: Safety – One Credit.** To reduce the risks to life, health and property resulting from fire and exposure to carbon monoxide. To achieve BREEAM Very Good fire and carbon monoxide (CO) detection and alarm systems must be incorporated into the design.
- **Mat 02: Responsible sourcing of materials – Criterion 1.** To recognise and encourage the reuse of materials and the specification of responsibly sourced materials for use where required in the refurbishment process. To achieve any BREEAM rating all timber and timber-based products used on the project is 'legally harvested and traded timber'.

BREEAM Excellent mandatory criteria

- All BREEAM Very Good mandatory criteria nominated above;
- **Ene 02: Energy efficiency rating post-refurbishment – 2.5 credits.** To encourage high levels of energy efficiency in the refurbished dwellings, thus reducing CO2 emissions, running costs and fuel poverty. BREEAM Very Good level requires a minimum EER of 70.
- **Wat 01: Internal Water Use – Two Credits.** To minimise the consumption of potable water in sanitary applications by encouraging the use of low water use fittings and water recycling systems. A calculated water consumption of ≤ 118 litres/person/day is required to achieve BREEAM Very Good.
- **Pol 03: Flooding – Two Credits.** To reward dwellings located in low flood risk areas and where dwellings are located in medium to high flood risk zones, to recognise where they are refurbished in accordance with a flood resilience/resistance strategy. A minimum of two credits must be achieved if a BREEAM rating of Excellent or Outstanding is targeted.

1.4 BREEAM Assessment – a two-stage process

The BREEAM Scheme allows for a building to be assessed at the design stage and post-construction 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:

1. An initial Design Stage certification – at this stage an Interim Certificate is issued, based on a provisional Rating.
2. 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.

2. APPROACH & METHODOLOGY

In order to gain an understanding of the likely BREEAM rating achievable for the application Site, Sol Environment Ltd (Sol) were appointed by the architect, e3 Design, on behalf of the client, Galliard Homes ('Client' hereafter), to undertake a BREEAM pre-assessment for the proposed redevelopment of Gas Works Road site in Reading.

In addition to this appointment Sol, as a registered BRE Accredited Professional and technical Advisor to the project, has provided design advice to the design team to ensure that the proposed development exceeds the minimum standards required by BREEAM.

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 ensure that the project achieves the aspired 'Very Good' rating.

At the time of the pre-assessment, the proposed development is at RIBA Design Stage 2 'Concept Design'. At this early design stage there is not sufficient detailed design information available to enable Design Stage BREEAM certification to be carried out and the BREEAM rating established as likely at pre-assessment cannot be formally awarded (see Section 6 for information on the formal assessment process).

The pre-assessment is intended to identify how the development will score when the current designs are formally assessed under the BREEAM Scheme.

3. DEVELOPMENT SUMMARY & RATING

3.1 Rating Findings

The design team are committed to aim to achieve a mixture of BREEAM 'Very Good' and 'Excellent' rating for the proposed dwellings. To meet local authority's policy requirement, 50% of the dwellings will target a BREEAM 'Excellent' rating and 50% will target 'Very Good'. The findings of the pre-assessment predict that the proposed 'Excellent' dwellings *are likely to achieve BREEAM 'Excellent'* (with a provisional score of 64.52%) and the proposed 'Very Good' dwellings *are likely to achieve BREEAM 'Very Good'* (with a provisional score of 74.76%) meeting the design team targets.

In awarding this score, the following assumptions have been made:

- Water:
 - High efficiency fittings are specified and installed to reduce the demand for potable water within the development - refer to Credit Wat 01;
- Materials:
 - The majority of the key building elements (by volume percentage) will achieve a Green Guide rating of A+ to A - refer to Credit Mat 01; and
- Waste:
 - The construction practices will be meet best practice guidelines to ensure waste efficiency benchmarks are met – refer to Credit Wst 02.

Sol has provided an assessment of the predicted BREEAM performance of the development (based on limited information available at outline stage). In addition, Section 5 identifies opportunities for improvement (approximately ranked in terms of cost / difficulty and the potential score by which the total will increase) which, dependant on those incorporated into the site design (and associated evidence is provided, see Appendix 1), would provide an improvement in BREEAM performance.

Although this report provides recommendations, specific requirements of BREEAM can easily be misinterpreted or excluded at design stage. It is noted that a BREEAM Accredited Professional has been appointed for the pre-planning application stages, however it is recommended therefore that this appointment is continued throughout all design stages to ensure the development proceeds in a manner that complies with the relevant requirements of BREEAM (*particularly those mandatory minimum requirements, which must be satisfied in order for the aspired rating to be certified*).

Table 3.1 below provides a summary of the BREEAM credits that are likely to be achieved, given current design intent as outlined by the design team.

Table 3.1; Credits likely to be achieved given current design intent							
Ref	Credit Title	Max available credits	% per credit	Likely credits	Credit criteria	Comments	Action for
Management							
Man 01	Home User Guide	3	1.09	3	Provision of a Home User Guide: Where a Home User Guide containing information listed in the 'User Guide Contents List' has been produced and supplied to all homes. Credits are awarded where a simple guide is provided to each dwelling, covering information relevant to the 'non-technical' home occupier for operational issues and for site and surroundings. The guide is also to cover efficiency of existing features where relevant. Headings to be included: About BREEAM Domestic Refurbishment Recommendations Report Energy Efficiency Water Use Transport Facilities Materials and Waste Emergency Information Local Amenities Provision of Information in Alternative format Super Homes Network Links and References	3/3 CREDITS TARGETED ALL CREDITS – targeted PRE-ASSESSMENT It is understood that a home user guide will be provided. Project Manager to ensure that requirement for a compliant Home User Guide is included in the Tender Prelims	Project Manager / Contactor

Man 02	Responsible Construction Practices	2	1.09	2	Credits are awarded where there is a commitment to comply with best practice site management principles using either the CCS or an alternative locally / nationally recognised scheme. 1 credit for compliance with the approved scheme (a CCS score between 25 and 34, with a score of at least 5 in each section). 2 credits where contractor 'Beyond' compliance of the relevant scheme (a CCS score between 35 and 39, with a score of at least 7 in each section). For Small Scale projects – Alternatively Checklist A-3 mandatory items to be achieved + 50% of Optional items (1 credit) Or; + 80% of Optional items (2 credits) are achieved. For the purpose of this issue a small scale project is a project consisting of fewer than 5 dwellings which are within the same building OR has a duration of less than 6 weeks.	2/2 CREDITS TARGETED ALL CREDITS – one credit targeted only PRE-ASSESSMENT Design team have confirmed that one credit only will be targeted and a CCS score between 35 and 39 with at least 7 in each section, will be achieved by the contractor. Project Manager to ensure that compliance will be included in the Tender Prelims	Project Manager / Contactor
					Exemplary Credit Requirement Exemplary performance is achieved for scores of 40 or more, with a score of at least 5 in each section (Innovation Credit).	0/1 EXEMPLARY CREDIT TARGETED ALL CREDIT – not targeted PRE-ASSESSMENT Exemplary Credit not targeted	N/A
Man 03	Construction Site Impacts	1	1.09	1	Large Scale Projects: 2 or more items of Sections a – e in Appendix A: Man03 Checklist A-4 are to be completed.	1/1 CREDIT TARGETED ALL CREDITS – targeted	Project Manager / Contractor

					Small Scale projects: 2 or more items of the sections a - d in Appendix A: Man03 Checklist A-5 are completed. The Credit is awarded where procedures exist in order to monitor, report and set targets to minimise environmental impacts associated with the following site construction activities: Large Scale projects (Checklist A-4 summary) - Monitor, report and set targets for CO2 or energy arising from site activities; - Monitor, report and set targets for water consumption arising from site activities; - Main Contractor with n environmental materials policy (LSP's); - Main Contractor operates an Environmental Management System (EMS) 80% of timber is reclaimed, reused or responsibly sourced Small Scale projects (Checklist A-5 summary) - Monitor, report and set targets for CO2 or energy arising from site activities; - Monitor, report and set targets for water consumption arising from site activities; - Main Contractor with n environmental materials statement; 80% of timber is reclaimed, reused or responsibly sourced.	PRE-ASSESSMENT The development is considered a Large Scale Project therefore at least 2 of the following criteria are required to be met: - Monitor, report and set targets for CO2 or energy arising from site activities; - Monitor, report and set targets for water consumption arising from site activities; - Main Contractor with n environmental materials policy (LSP's); - Main Contractor operates an Environmental Management System (EMS) 80% of timber is reclaimed, reused or responsibly sourced Project Manager to ensure that compliance will be included in the Tender Prelims.	
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					For the purpose of this issue a small scale project is a project consisting of fewer than 5 dwellings which are within the same building OR has a duration of less than 6 weeks.		
Man 04	Security	2	1.09	2	One credit: Secure Windows and Doors Where retained external doors and windows are deemed secure in line with the requirements set out in CN6, and where newly added external door sets and windows are appropriately certified.	PRE-ASSESSMENT It is understood that a security specialist will be engaged therefore the first credit is not relevant.	Architect
					Two Credits: Awarded for complying with Section 2 - Physical Security from Secured by Design - New Homes. Where the principles and guidance of Secured by Design Section 2 – Physical Security are complied with and... A security specialist such as a Police Architectural Liaison Officer (ALO) or Crime Prevention Design Advisor (CPDA), or alternative, needs to be appointed at the design stage and their recommendations incorporated into development design. Note. Secured by Design certification is not required to achieve these credits however full compliance with the relevant section must be demonstrated.	2/2 CREDITS TARGETED FIRST & SECOND CREDITS – targeted PRE-ASSESSMENT It is understood that a security specialist will be engaged during the design stage and recommendations incorporated into the design. NOTE: Security Specialist to be engaged during the design stage.	Architect / SbD
Man 05	Protection & Enhancement of Ecological Features	1 + 1	1.09	1 + 1	One credit is awarded where: 1. Where a site survey is carried out by a member of the project team or a suitably qualified ecologist (SQE) to determine the presence of ecological features.	1/1 CREDIT FIRST CREDIT – targeted PRE-ASSESSMENT	Architect or Ecologist

					2. Where protected species have been identified as present on-site, the relevant Statutory Nature Conservation Organisation (SNCO) has been notified and protected species have been adequately protected. 3. Where all existing features of ecological value on the refurbishment site potentially affected by the works, are maintained and adequately protected during refurbishment works.	An Extended Phase 1 Survey and Bat Risk Assessment has been conducted by Total Ecology (qualified ecologists). Recommendations include: - the two main buildings on site are subject to presence/absence survey for bat roosts; - All clearance works should ideally be undertaken over the winter months (September- February), well in advance of any breeding bird activity. - installation of a wall mounted Schwegler bat box on the exterior of the larger building or the inclusion of a bat access tile in the roof	
					Exemplary Credit 4. Where a suitably qualified ecologist has been appointed to recommend appropriate ecological features that will positively enhance the ecology of the site and where the developer adopts all general ecological recommendations and 30% of additional recommendations.	1/1 EXEMPLARY CREDIT EXEMPLARY CREDIT – targeted PRE-ASSESSMENT If all the general recommendations and 30% of additional recommendations are implemented this credit could be achieved. NOTE: To achieve this credit, it is recommended that the ecologist update their report to include some additional recommendations	Ecologist
Man 06	Project Management	2 + 2	1.09	2 + 0	CREDIT 1: Project Roles and Responsibilities 1. Where all of the project team are involved in the project decision making and individual and shared roles and responsibilities are assigned in accordance with CN1 and CN2 as follows: a. For small scale projects, the project manager writes a project implementation plan and	1/1 CREDIT FIRST CREDIT – targeted PRE-ASSESSMENT	Architect / Project Manager

					holds an initiation meeting to assign individual and shared responsibilities amongst the project team including all trades on site: b. For large scale projects, the project manager assigns individual and shared responsibilities across the following key design and refurbishment stages: i. Planning and Building control notification ii. Design iii. Refurbishment iv. Commissioning and handover v. Occupation <i>For the purpose of this issue a 'small scale project' is a project consisting of fewer than 5 dwellings which are within the same building OR has a duration of less than 6 weeks.</i>	Development is >5 dwellings therefore it is treated as a Large Scale Project. It is assumed that the Project Manager / Architect will assign individual and shared responsibilities across the key development stages	
					CREDIT 2: Handover & Aftercare 2. Where a handover meeting is arranged 3. Where 2 or more of items a-c have been committed to determine project success: a. A site inspection within 3 months of occupation. b. Conduct post occupancy interviews with building occupants or a survey via phone or posted information within 3 months of occupation. c. Longer term after care e.g. a helpline, nominated individual	1/1 CREDIT SECOND CREDIT – targeted PRE-ASSESSMENT Contractor to commit to two or more of the following: a. A site inspection within 3 months of occupation. b. Conduct post occupancy interviews with building occupants or a survey via phone or posted information within 3 months of occupation.	Project Manager / Contractor

					c. Longer term after care e.g. a helpline, nominated individual Project Manager to ensure that compliance will be included in the Tender Prelims.	
				EXEMPLARY CREDIT 1: Early Design Input 4. Where a BREEAM Accredited Professional (AP) has been appointed to oversee key stages within the project at an early stage, prior to the production of a refurbishment specification. Or 5. For small scale projects where a BREEAM Accredited Professional (AP) or BREEAM Domestic Refurbishment Assessor has been appointed to oversee key stages within the project at an early stage, prior to the production of a refurbishment specification.	0/1 EXEMPLARY CREDIT FIRST EXEMPLARY CREDIT – not targeted PRE-ASSESSMENT At this stage it is assumed that a BREEAM Accredited Professional has not been engaged therefore no credit can be awarded.	N/A
				EXEMPLARY CREDIT 2: Thermographic and Air Testing 6. Where Thermographic surveying and Airtightness testing have been carried out at both pre and post refurbishment stages. 7. Where an improved air tightness target has been set at design stage and testing demonstrates that this has been achieved post refurbishment.	0/1 EXEMPLARY CREDIT SECOND EXEMPLARY CREDIT – not targeted PRE-ASSESSMENT It has been assumed that air pressure testing will be conducted but thermographic testing will not therefore credit cannot be achieved.	N/A

Health and Wellbeing							
Hea 01	Daylighting	2	1.42	2	First credit—maintaining good daylighting	1/1 CREDIT TARGETED	M&E / Architect

					1. For existing dwellings and change of use projects (e.g. conversions): a) The refurbishment results in a neutral impact on the dwellings daylighting levels in the kitchen, living room, dining room and study with “no” answered for all questions in Appendix A: Hea 01, parts 1 and 2 (for existing dwellings) or parts 3 and 4 (for change of use e.g. conversions). 2. Where the property is being extended: a) new spaces achieve minimum daylighting levels See Criteria CN1 b) the extension does not reduce daylighting levels in the kitchen, living room, dining room or study of neighbouring properties	FIRST CREDIT – targeted PRE-ASSESSMENT Although the existing window layouts will be significantly changing it is assumed that all new and existing relevant spaces will achieve the minimum daylighting requirements. This assumption is based on the thin building footprints and large window areas. Daylight assessment has been conducted by Price & Myer and submitted as a part of the planning application. The assessment confirms that 98% of the main habitable rooms in the proposed development receive ADF values exceeding the minimum standards (2%).	
					Second credit—minimum daylighting 3. The dwelling achieves following minimum daylighting levels in the kitchen, living room, dining room and study. - Where kitchens achieve a minimum daylight factor of at least 2% - Where living rooms, dining rooms and studies achieve a minimum average daylight factor of at least 1.5% - Where 80% of the working plane in the kitchen, living room, dining room and study, receives direct light from the sky	1/1 CREDIT TARGETED SECOND CREDIT – targeted PRE-ASSESSMENT Although the existing window layouts will be significantly changing it is assumed that all new and existing relevant spaces will achieve the minimum daylighting requirements. This assumption is based on the thin building footprints and large window areas Daylight assessment has been conducted by Price & Myer and submitted as a part of the planning	M&E / Architect

					application. The assessment confirms that 98% of the main habitable rooms in the proposed development receive ADF values exceeding the minimum standards (2%).		
Hea 02	Sound Insulation	4	1.42	2 or 4	To ensure the provision of acceptable sound insulation standards and so minimise the likelihood of noise complaints. Up to four credits are awarded (achieving and going beyond national Regulations) Credits are awarded depending on the type of dwelling and whether they are subject to sound testing as follows: Properties where sound testing has been carried out: 1. Where sound testing has been carried out and where the dwelling meets or goes beyond Regulations, up to four credits may be awarded according to the sound insulation credit requirements below Credits are awarded where airborne sound insulation values exceed those required by Building Regs Part E (2003), by: 0dB (i.e. part E compliant = 2 credit), 3dB (= 3 credit), 5dB (= 4 credits). To achieve the above credits, impact sound insulation values must also be lower than those required by Building Regs Part E (2003), by: 0dB (i.e. part E compliant = 2 credit),	2/4 CREDIT TARGETED (Very Good Dwellings) 4/4 CREDIT TARGETED (Excellent Dwellings) ALL CREDITS – 2 or 4 targeted PRE-ASSESSMENT At this stage in the assessment it is assumed that the developer will complete the appropriate testing to ensure that 2 credits are achieved for the Very Good dwellings and 4 credits are achieved for the Excellent dwellings	Acoustician / Architect

					• 3dB (= 3 credit), • 5dB (= 4 credits). This must be demonstrated by carrying out pre-completion testing by a SQA. Properties where sound testing cannot be carried out 2. Where existing separating walls and floors are designed to meet the requirements of Building Regulations with compliant construction details, two credit can be awarded (CN6). 3. Where a suitably qualified acoustician (SQA) provides recommendations for the specification of all existing separating walls and floors, confirming in their professional opinion that they have the potential to meet or exceed, the sound insulation credit requirements. Where these recommendations are implemented up to four credits may be awarded as shown in Table - 15 and Table - 14. For historic buildings credits are awarded where airborne and impact sound insulation values are an improvement on existing conditions, by 0dB (i.e. neutral impact = 1 credit), 3dB (= 2 credit), 5dB (= 3 credit), 8dB (= 4 credits). This can be demonstrated by carrying out pre-completion testing by a SQA.		
Hea 03	Volatile Organic Compounds	1	1.42	1	One credit—avoiding the use of VOCs	1/1 CREDIT TARGETED	Architect

					1. Where all decorative paints and varnishes used in the refurbishment have met the requirement in Table – 14 (European Standard BS EN 13300:2001). 2. Where at least five of the eight remaining product categories listed have met the testing requirements and emission levels for Volatile Organic Compound (VOC) emissions against the relevant standards. 3. Where five or less products are specified within the refurbishment; all must meet the requirements in order to achieve this credit.	FIRST CREDIT – 1 targeted PRE-ASSESSMENT Design team has confirmed that the standards will be met and this credit will be achieved.	
Hea 04	Inclusive Design	2 + 1	1.42	0	One credit—minimum accessibility 1. An access expert or suitably qualified member of the design team (CN6) has completed section 1 of Appendix A: Hea 04, accessibility template with evidence provided of the measures implemented in the refurbishment a. The access statement demonstrates reasonable provision to provide accessibility to the dwelling covering section 1 of Checklist A-8 in accordance with CN3 and CN4.	0/1 CREDIT TARGETED FIRST CREDIT – not targeted PRE-ASSESSMENT Due to the levels on the site and the need for stair access to all but two of the dwellings it is assumed that this credit will not be achievable.	N/A
					Two credits—advanced accessibility 2. An access expert or suitably qualified member of the design team (CN6) has completed sections 1 and 2 of Appendix A: Hea 04 with evidence provided of the measures implemented in the refurbishment a. The access statement demonstrates reasonable provision to provide	0/1 CREDIT TARGETED SECOND CREDIT – not targeted PRE-ASSESSMENT Due to the levels on the site and the need for stair access to all but two of the dwellings it is assumed that this credit will not be achievable.	N/A

					accessibility to the dwelling covering sections 1 and 2 of Checklist A-8 in accordance with CN3 and CN4.		
					Exemplary Credit— lifetime homes and Part M 3. One innovation credit can be awarded where an access expert suitably qualified member of the design team (CN6) has completed sections 1, 2 and 3 of Appendix A: Hea 04 1, access statement template with evidence provided of the measures implemented in the refurbishment: a. The access statement demonstrates reasonable provision to meet sections 1, 2 and 3 of Appendix A: Hea 04 1 in accordance with CN3 and CN4.	0/1 EXEMPLARY CREDIT TARGETED FIRST EXEMPLARY CREDIT – not targeted PRE-ASSESSMENT Due to the levels on the site and the need for stair access to all but two of the dwellings it is assumed that this credit will not be achievable.	N/A
Hea 05	Ventilation	2	1.42	2	One credit—minimum ventilation requirements One credit can be awarded where the following whole dwelling is brought up to the following ventilation requirements: 1. A minimum level of background ventilation is provided (with trickle ventilators or other means of ventilation) for all habitable rooms, kitchens, utility rooms and bathrooms compliant with section 7, Building Regulations Approved Document Part F, 2010 2. A minimum level of extract ventilation is provided in all wet rooms (e.g. kitchen, utility and bathrooms), compliant with section 5, Building Regulations Approved Document Part F 2010. 3. A minimum level of purge ventilation is provided in all habitable rooms and wet rooms, compliant with	1 CREDIT MANDATORY TO ACHIEVED ANY BREEAM RATING 1/1 CREDIT TARGETED FIRST CREDIT – targeted PRE-ASSESSMENT Due to the thin footprint it is assumed ventilation will be provided for all dwelling that meets the requirements of Section 5 and Section 7 of Building Regulations Part F in full	M&E

					section 7, Building Regulations Approved Document Part F, 2010. 4. The building is a historic building (CN4) and meets the requirements for Historic Buildings below.		
					Two credits—advanced ventilation Two credits can be awarded where: 5. Ventilation is provided for the dwelling that meets the requirements of Section 5 of Building Regulations Part F in full 6. Where the building is a historic building and meets the requirements for Historic Buildings (CN4).	1/1 CREDIT TARGETED SECOND CREDIT – targeted PRE-ASSESSMENT Due to the thin footprint it is assumed ventilation will be provided for all dwelling that meets the requirements of Section 5 and Section 7 of Building Regulations Part F in full	M&E
Hea 06	Safety	1	1.42	1	One Credit — fire and carbon monoxide (CO) detection and alarm systems Where a compliant fire detection and fire alarm system is provided in accordance with compliance notes 2-8. - Where the dwelling is supplied with mains gas or where any other form of fossil fuel is used within the building (e.g. coal), a compliant fire and carbon monoxide detector and alarm system is provided in accordance with compliance notes 2-8. - Where the project involves electrical re-wiring the power supply for the smoke alarm and compliant carbon monoxide alarm systems are derived from the dwellings main electricity supply in accordance with CN5.	1 CREDIT MANDATORY TO ACHIEVED ANY BREEAM RATING 1/1 CREDIT TARGETED FIRST CREDIT – targeted PRE-ASSESSMENT It is assumed that compliant fire and carbon monoxide (CO) detection and alarm systems will be installed to all dwellings	M&E

					Where the project does not involve electrical re-wiring the power supply for the smoke alarm and carbon monoxide alarm systems are derived from a battery supply.		
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Energy							
Ene 01	Improvement in Energy Efficiency Rating	6	1.48	2.5	Up to 6 credits are awarded – improving the dwellings Energy Efficiency Rating (EER) 1. Where the refurbishment results in an improvement to the dwellings Energy Efficiency Rating. Credits are awarded (from 1 to 6) based on the percentage performance improvement progressively better than the existing building SAP EER. Credits are derived using BREEAM Domestic Refurbishments Energy calculator. This takes into account the buildings operational demand, consumption and resulting CO₂ emissions, and utilises performance data from approved energy calculation software.	2.5 / 6 CREDIT TARGETED ALL CREDITS – 2.5 credits targeted PRE-ASSESSMENT It has been conservatively assumed that 2.5 Credits will be achievable for all dwellings. NOTE – Mandatory BREEAM Excellent criteria achieved	M&E / Energy Assessor
Ene 02	Energy Efficiency Rating Post Refurbishment	4	1.48	2.0 or 2.5	Up to 4 credits are awarded – EER Post Refurbishment	2.0 CREDITS MANDATORY TO ACHIEVED BREEAM VERY GOOD RATING	M&E / Energy Assessor

					1. Where as a result of refurbishment, the dwelling meets a minimum Energy Efficiency Rating, credits can be awarded Credits are awarded (from 1 to 4) based on the percentage performance improvement progressively better than the existing building SAP EER. Benchmark minimum standards are as follows: EER ≥ 50 = 0.5 credits (BREEAM Pass); EER ≥ 55 = 1.0 credits (BREEAM Good); EER ≥ 65 = 2.0 credits (BREEAM Very Good); EER ≥ 70 = 2.5 credits (BREEAM Excellent); EER ≥ 81 = 3.5 credits (BREEAM Outstanding); Credits are derived using BREEAM Domestic Refurbishments Energy calculator. This takes into account the buildings operational demand, consumption and resulting CO₂ emissions, and utilises performance data from approved energy calculation software.	2.5 CREDITS MANDATORY TO ACHIEVED BREEAM EXCELLENT RATING 2.0 / 4 CREDIT TARGETED (Very Good Dwellings) 2.5 / 4 CREDIT TARGETED (Excellent Dwellings) ALL CREDITS – 2.5 credits targeted PRE-ASSESSMENT It has been conservatively assumed that 2.5 Credits will be achievable for all dwellings. NOTE – Mandatory BREEAM Excellent and Very Good criteria achieved	
Ene 03	Primary Energy Demand	7	1.48	5	Primary Energy Demand Targets. Where as a result of refurbishment the dwelling meets the Primary Energy Demand targets, up to 7 credits may be awarded. Credits are derived using BREEAM Domestic Refurbishments Energy calculator. This takes into account the buildings operational demand, consumption and resulting CO₂ emissions, and utilises performance data from approved energy calculation software.	5/7 CREDIT TARGETED ALL CREDITS – 5 credits targeted PRE-ASSESSMENT It has been assumed that 5 Credits will be achievable for all dwellings.	M&E / Energy Assessor

Ene 04	Low or Zero Carbon Energy Technology	2	1.48	0	First Credit One credit: - Where at least 10% of the dwellings Primary Energy Demand per annum is supplied by low or zero carbon technologies AND - Where the dwelling has reduced energy demand prior to the specification of renewable technologies with a maximum Primary Energy Demand as follows: - For detached, semi-detached, bungalows and end terraces: 250 kWh/m2/year - Mid terraces and flats: 220 kWh/m2/year	0/1 CREDIT TARGETED FIRST CREDIT – not targeted PRE-ASSESSMENT Solar PV array is proposed covering the majority of the available roof area but the total array only accounts for approximately 8% of the PED. (1 POTENTIAL ADDITIONAL CREDIT if the community heat network is powered by a biomass boiler or CHP)	N/A
					Second Credit Two credits: - Where for mid to high rise flats at least 15% of each dwellings Primary Energy Demand per annum is supplied by low or zero carbon technologies - Where for dwellings other than mid to high rise flats at least 20% of each dwellings Primary Energy Demand per annum is supplied by low or zero carbon technologies AND - Where the dwelling has reduced energy demand prior to the specification of	0/1 CREDIT TARGETED SECOND CREDIT – not targeted PRE-ASSESSMENT Solar PV array is proposed covering the majority of the available roof area but the total array only accounts for approximately 8% of the PED. (1 POTENTIAL ADDITIONAL CREDIT if the community heat network is powered by a biomass boiler or CHP)	N/A

					renewable technologies with a maximum Primary Energy Demand as follows: a. For detached, semi-detached, bungalows and end terraces: 250 kWh/m2/year b. Mid terraces and flats: 220 kWh/m2/year.		
Ene 05	Energy Labelled White Goods	2	1.48	1	First credit – Fridges, freezers and fridge-freezers - Fridges and freezers or fridge-freezers have an A+ rating or better under the EU Energy Efficiency Labelling Scheme OR - Where no white goods are provided to the dwelling(s) but the EU Energy Efficiency Labelling Scheme Information Leaflet is provided to each dwelling	1/1 CREDIT TARGETED FIRST CREDIT – targeted PRE-ASSESSMENT It is assumed that all specified fridges and freezers or fridge-freezers will have an A+ rating or better.	Architect
					Second credit – washing machines, dishwashers, tumble dryers and washer dryers - Washing machines have an A++ rating or better under the EU Energy Efficiency Labelling Scheme - Dishwashers have an A+ rating or better under the EU Energy Efficiency Labelling Scheme AND EITHER - Washer dryers and tumble dryers have a A rating under the EU Energy Efficiency Labelling Scheme (where a washer dryer	0/1 CREDIT TARGETED SECOND CREDIT – not targeted PRE-ASSESSMENT It is assumed that washing machines, dishwashers, tumble dryers and washer dryers will not be installed by the developer therefore this credit is not achievable. (1 POTENTIAL ADDITIONAL CREDIT if washing machines, dishwashers, tumble dryers and washer dryers are installed by the developer and appropriately rated)	N/A

					is provided, it is not necessary to also provide a washing machine) OR Where a washer dryer or tumble dryer is not provided, the EU Energy Efficiency Labelling Scheme Information Leaflet is provided to each dwelling		
Ene 06	Drying Space	1	1.48	1	One credit awarded for the provision adequate, secure internal or external space with posts and footings, or fixings holding: a. 1-2 bedrooms: 4m+ of drying line b. 3+ bedrooms: 6m+ of drying line Design Team are to ensure that compliant drying space is provided within each dwelling to ensure that this credit is achieved. This could be provided for example, via installation of a drying line over a bath (with extract ventilation of 30L/s), or permanently fixed line to the terrace/ balcony areas.	1/1 CREDIT TARGETED FIRST CREDIT – targeted PRE-ASSESSMENT It is assumed that compliant drying space will be provided in each of the dwelling bathrooms	Architect
Ene 07	Lighting	2	1.48	2	One credit – External lighting 1. Where Energy Efficient Space lighting (including lighting in communal areas) and Energy Efficient Security lighting is provided - OR 2. Where Energy Efficient Space lighting (including lighting in communal areas) and no Security Lighting is provided	1/1 CREDIT TARGETED FIRST CREDIT – targeted PRE-ASSESSMENT It is assumed that all external lighting will be Energy Efficient Space lighting (including lighting in communal areas) and Energy Efficient Security lighting.	M&E

					One credit - Internal Lighting 3. One credit is awarded where the energy required for internal lighting is minimised through the provision of a maximum average wattage across the total floor area of the dwelling of 9 watts/m².	1/1 CREDIT TARGETED SECOND CREDIT – targeted PRE-ASSESSMENT It is assumed that all dwellings will achieve a maximum average wattage across the total floor area of the dwelling of 9 watts/m²	M&E
Ene 08	Energy Display Devices	2 + 1	1.48	2 + 1	One credit 1. Where current electricity consumption data is displayed to occupants by a compliant energy display devices OR 2. Where current primary heating fuel consumption data is displayed to occupants by a compliant Energy Display Devices.	1/1 CREDIT TARGETED FIRST CREDIT – targeted PRE-ASSESSMENT It has been assumed that current electricity consumption data will displayed to occupants by a compliant energy display devices.	M&E
					Two Credits 3. Where current electricity AND primary heating fuel consumption data are displayed to occupants by a compliant correctly specified Energy Display Devices. OR 4. Where electricity is the primary heating fuel and current electricity consumption data are displayed to occupants by a compliant Energy Display Devices.	1/1 CREDIT TARGETED SECOND CREDIT – targeted PRE-ASSESSMENT It has been assumed that current electricity AND primary heating fuel consumption data will displayed to occupants by a compliant energy display devices.	M&E

					Exemplary Credit Where the above has been achieved and any specified Energy Display Devices is capable of recording consumption data	1/1 EXEMPLARY CREDIT TARGETED FIRST EXEMPLARY CREDIT – targeted PRE-ASSESSMENT It has been assumed that current electricity AND primary heating fuel consumption data will be displayed to occupants by a compliant energy display device that is capable of recording consumption data.	M&E
Ene 09	Cycle Storage	2	1.48	1 or 2	One credit: 1. Where individual or communal compliant cycle storage is provided for the following number of cycles: a. Studios or 1 bedroom dwellings – storage for 1 cycle for every two dwellings b. 2 and 3 bedroom dwellings – storage for 1 cycle per dwelling c. 4 bedrooms and above – storage for 2 cycles per dwelling	1/1 CREDIT TARGETED FIRST CREDIT – targeted PRE-ASSESSMENT A cycle storage space has been provided in the basement of the smaller building for 34 bicycles. The following dwellings are proposed within the development: 2 x Studio Flats 20 x 1 Bed Flats 11 x 2 Bed Flats 1 x 3 Bed Flats Therefore, to achieve this credit 23 cycle spaces (22x0.5 + 12x1) are required. 34>23 therefore credit achieved	Architect
					Two credits: 2. Where individual or communal compliant cycle storage is provided for the following number of cycles:	1/1 CREDIT TARGETED SECOND CREDIT – targeted (Excellent Dwellings only)	Architect

					a. Studios or 1 bedroom dwellings – storage for 1 cycle per dwelling b. 2 and 3 bedroom dwellings – storage for 2 cycles per dwelling c. 4 bedrooms and above – storage for 4 cycles per dwelling.	PRE-ASSESSMENT 50% of the dwellings will achieve the second credit only. Therefore $23 \times 1.5 = 35$ cycle spaces required. NOTE: 1 additional cycle space required to be found in the basement communal storage space to ensure the second credit is achieved for the Excellent Dwellings.	
Ene 10	Home Office	1	1.48	0 or 1	One credit is awarded for the provision of space for a home office. For dwellings with three or more bedrooms, a suitable room is defined as a room other than the kitchen, living room, master bedroom or bathroom. For dwellings with one or two bedrooms or studio homes, a suitable room is defined as a room other than the kitchen, living room or bathroom, however may be within the master bedroom. In all cases, the room must be large enough to allow the intended use of that room, e.g. 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 studio homes, where the living room and/or kitchen forms part of the same room as the master bedroom, the home office is allowed to be in this space The space dedicated for use as a home office must have adequate space (1.8m wall length), services (2	0/1 CREDIT TARGETED ('Very Good' Dwellings) 1/1 CREDIT TARGETED ('Excellent' Dwellings) FIRST CREDIT – targeted PRE-ASSESSMENT It has been conservatively assumed that only the dwellings with more than 1 bedroom will be able to provide sufficient space for a 'home office'	Architect

					double power sockets & a telephone point), ventilation (an openable window $\geq 0.5\text{m}^2$ or alternative ventilation) and daylighting (a window with either width or height $\geq 450\text{mm}$)		
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Water							
Wat 01	Internal Water Use	3	2.20	1 or 2	Credits awarded based on the predicted average household water consumption: Maximum consumption > 150 l/p/day = 0 credits; 140-150 l/p/day = 0.5 credits; 129-139 l/p/day = 1.0 credits (BREEAM V.G.); 118-128 l/p/day = 1.5 credits; 107-117 l/p/day = 2.0 credits (BREEAM Exc.); 96-106 l/p/day = 2.5 credits; < 95 l/p/day = 2.0 credits (BREEAM Outs.);	1 CREDIT MANDATORY TO ACHIEVED BREEAM VERY GOOD RATING 2 CREDITS MANDATORY TO ACHIEVED BREEAM EXCELLENT RATING 1/3 CREDITS TARGETED ('Very Good' Dwellings) 2/3 CREDITS TARGETED ('Excellent' Dwellings) ALL CREDITS – targeted PRE-ASSESSMENT It has been assumed that low flow tapware, showers and toilets will be specified to ensure a 107-117l/p/day or better water consumption is achieved for the Excellent Dwellings). NOTE – 1 credit is mandatory to achieve BREEAM Very Good. 2 credits are mandatory to achieve BREEAM Excellent.	Architect / M&E

Wat 02	External Water Use	1	2.20	1	One credit 1. Where a compliant rainwater collection system for external/internal irrigation use has been provided to dwellings. A compliant rainwater collection system should comply with all of the following: i) No open access at the top of the collector (a childproof lid is allowed) ii) Provision of a tap or other arrangement for drawing off water at a height suitable for filling a standard watering can. iii) Connection to the rainwater downpipes with an automatic over-flow into the conventional rainwater drainage system iv) A means of detaching the rainwater downpipe and access provision to enable cleaning of the interior v) Where the collection system is to be sited outside, and not buried, it must be stable and adequately supported; the material used for the container shall be durable and opaque to sunlight vi) Where the system is part of a rainwater collection system providing internal water, water for external use may be provided in a separate tank to water required for internal water. This could be an overflow pipe leading from the main tank to a compliant water butt for external water use OR Where dwellings have no individual or communal garden space.	1/1 CREDIT TARGETED FIRST CREDIT – targeted PRE-ASSESSMENT It has been assumed that a compliant rainwater collection system for external/internal irrigation use will be provided.	Architect / Civil / M&E
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Wat 03	Water Meter	1	2.20	0	Appropriate water meter for measuring usage of mains potable water has been provided to dwelling/s A meter that provides a visible display of mains potable water consumption to occupants. The meter should be a permanent feature secured within the home in a location visible to occupants (i.e. not hidden within a cupboard) and capable of recording and displaying historic water consumption to allow water consumption to be monitored over time. The meter should be capable of displaying current consumption either instantaneously or at half hourly intervals.	0/1 CREDIT TARGETED FIRST CREDIT – not targeted PRE-ASSESSMENT It has been assumed that water will not be individually metered to each dwelling therefore credit not achievable	N/A
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Materials							
Mat 01	Environmental Impact of Materials	25	0.18	12.5	1. The BREEAM Domestic Refurbishment Mat1 calculator is used to determine the number of credits awarded. Credits are awarded according to the impact of new materials according to their Green Guide Rating and their impact on improving the thermal performance of the dwelling for the following elements: a. Roof b. External walls c. Internal walls (including separating walls) d. Upper and ground floors e. Windows 2. Up to a maximum of 25 credits can be awarded through achieving a combination of the credits available for each element	12.5/25 CREDIT TARGETED ALL CREDITS – 12.5 CREDITS targeted PRE-ASSESSMENT Design team have confirmed that elemental build up and all green guide ratings will be provided by the architect and it is estimated that >80% of all materials will achieve an A rating or higher.	Architect

					3. Retained elements, where no work is being carried out on them, are assessed against the Refurbishment Green Guide Calculator. Typically, they will be counted as being very low impact by the calculator. A maximum of 5 credits are available with elements rated from A+ (6) to E 4. Retained elements undergoing refurbishment (e.g. the installation of solid wall insulation) are assessed against the Refurbishment Green Guide Calculator. A maximum of 5 credits are available for refurbished elements depending on their Refurbishment Green Guide rating from A+ (6) to E. 5. New elements such as new windows, a newly constructed roof or walls are assessed against the Green Guide to Specification with a maximum of 3 credits available depending on their Green Guide rating from A+ to E 6. Additional credits are awarded for retained elements undergoing refurbishment as detailed in the calculation procedure (Materials) depending on the thermal improvement made as a result of refurbishment based upon the U value of elements before and after refurbishment.		
Mat 02	Responsible Sourcing of Materials	15	0.18	9	Pre Requisite: Legally Harvested Timber 1. All timber and timber-based products used on the project is 'legally harvested and traded timber' (see relevant definitions). Note: 1. a It is a minimum requirement for achieving a BREEAM rating (for any rating level) that compliance with criterion 1 is confirmed. 1.b For other materials there are no prerequisite requirements at this stage.	PRE-REQUISITE CREDIT MANDATORY TO ACHIEVED ANY BREEAM RATING PRE-REQUISITE PRE-ASSESSMENT It has been assumed that all timber and timber-based products used on the project will be 'legally harvested and traded timber'	Project Manager / Contractor

					Project Manager to ensure that this requirement is included in the Tender Prelims	
				Up to 3 Credits – Sustainable Procurement Plan 2. Where the principal contractor sources materials for the project in accordance with a documented sustainable procurement plan (see the relevant definitions in the additional information section) three credits can be awarded OR 3. Where the principal contractor is a Micro-enterprise (according to the relevant definitions in the additional information section) up to 3 credits are available: 3.a Where the principal contractor addresses part 1 OR part 2 of Checklist A-9: Sustainable procurement statement one credit can be awarded. 3.b Where the principal contractor addresses parts 1 AND 2 of Checklist A-9: Sustainable procurement statement two credits can be awarded. 3.c Where the principal contractor addresses parts 1, 2 AND 3 of Checklist A-9: Sustainable procurement statement three credits can be awarded.	3/3 CREDITT TARGETED ALL CREDITS – targeted PRE-ASSESSMENT Contractor prepare a Sustainable Procurement Plan and will sources materials for the project in accordance with that plan. Project Manager to ensure that this requirement is included in the Tender Prelims	Project Manager / Contractor
				Up to 12 credits - Responsible sourcing of materials (RSM) 4. The available RSM credits (refer to Table - 44) can be awarded where the applicable building materials (refer to Table - 26) are responsibly	6/12 CREDITT TARGETED ALL CREDITS – targeted PRE-ASSESSMENT	Project Manager / Contractor

					sourced in accordance with the BREEAM methodology, as defined in steps 1 to 2 in Mat 02 Calculation Procedure B-8	Contractor will source materials with responsible sourcing certification and will provide all delivery notes or purchase orders to confirm materials sources. Project Manager to ensure that this requirement is included in the Tender Prelims	
Mat 03	Insulation	8	0.18	8	Pre-requisite Any new insulation specified for use within the following building elements must be assessed: - External walls - Ground floor - Roof - Building services	PRE-REQUISITE PRE-ASSESSMENT Design team and contractor to ensure that all insulation is assessed	M&E / Architect / Contractor
					4 Credits - Embodied Impact 1. Where the Insulation Index for new insulation used in the buildings is ≥ 2 and is calculated using the BREEAM Domestic Refurbishment Mat3 Insulation Calculator with reference to CN1, CN2 and CN3. 2. Where Green Guide ratings, required by the BREEAM Domestic Refurbishment Mat3 Insulation Calculator are determined using the Green Guide to specification tool.	4/4 CREDIT TARGETED ALL CREDITS – targeted PRE-ASSESSMENT Design team and contractor will ensure that the Insulation Index for all the building fabric and services insulation will be ≥ 2 . M&E / Architect / Project Manager to ensure that this requirement is included in the Tender Prelims	M&E / Architect / Contractor
					4 Credits - Responsible Sourcing 3. Where $\geq 80\%$ of the new thermal insulation used in the building elements is responsibly sourced.	4/4 CREDIT TARGETED ALL CREDITS – targeted	M&E / Architect / Contractor

						PRE-ASSESSMENT Design team and contractor will ensure that $\geq 80\%$ of the new thermal insulation used in the building elements is responsibly sourced. M&E / Architect / Project Manager to ensure that this requirement is included in the Tender Prelims	
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Waste							
Was 01	Household Waste	2	0.60%	1	First credit – Recycling facilities In the event of the dwellings being served by a Local Authority collection scheme, one of the following requirements measures should be implemented; - A single bin (at least 30 l capacity) is provided where recyclable household waste is sorted after collection; or - Three separate bins (with a total capacity of 30 l and no individual bin smaller than 7 l) are provided where recyclable household waste is sorted before collection.	1/1 CREDIT TARGETED FIRST CREDIT – targeted PRE-ASSESSMENT It has been assumed that this credit will be achievable. The local authority confirms that recycling is collected and sorted post collection. Architect to ensure appropriate storage (both internal and external) is provided. The site plan confirms that a bin store area has been designated adjacent to Gas Works Road.	Architect
					Second credit – Composting Facilities an interior container is provided for kitchen composting waste of at least seven litres	0/1 CREDIT TARGETED SECOND CREDIT – not achievable PRE-ASSESSMENT	N/A

						Local Authority doesn't currently have a food waste collection service therefore it is assumed that this credit will not be achievable	
Was 02	Refurbishment Site Waste Management	3	0.60%	3	<u>Projects up to £100K</u> 3 credits achieved where waste is managed in accordance with Appendix A Was 02.	N/A	N/A
					<u>Projects up to £300K</u> 3 credits achieved where a Level 1 SWMP is in place and compliant with CN3	N/A	N/A
					<u>Projects above £300K</u> First credit achieved where a level 2 SWMP CN4 compliant Second credit achieved (good practice) where: - the first credit has been achieved; - Non-hazardous construction waste generated by the dwellings refurbishment meets or exceeds the resource efficiency benchmark in accordance with CN7; - the amount of waste generated per £100,000 of project value is recorded in the SWMP; - a pre-refurbishment audit of the existing building is completed in accordance with CN10; and - the demolition is included as part of the refurbishment programme, then the audit should also cover demolition materials Third credit achieved (best practice) where: - the first two credits have been achieved; and	3/3 CREDIT TARGETED ALL CREDITS – targeted PRE-ASSESSMENT The development is >£300k therefore it is assumed that the contractor will produce a compliant Level 2 SWMP. And the following benchmarks will be included in the SWMP. <u>Resource efficiency</u> ≤26.52m³ (or 13.90 tonnes) of non-hazardous construction waste generated per £100,000 of project value <u>Refurbishment demolition waste diversion benchmarks</u> 70% by volume (or 65% by tonnage) of non-hazardous construction waste will be diverted from landfill	Project Manager / Contractor

					Non-hazardous demolition waste generated by the dwellings refurbishment meets or exceeds the refurbishment & demolition waste diversion benchmarks in accordance with CN8.	80% by volume (or 90% by tonnage) of non-hazardous demolition waste will be diverted from landfill The contractor or design team will conduct a pre-demolition audit and prepare an appropriate report. Project Manager to ensure that compliance will be included in the Tender Prelims.	
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Pollution							
Pol 01	NO _x Emissions	3	0.75	3	Credits are awarded where the space heating & hot water system has a dry NO _x emission level (0% O ₂ excess) limit of <100mg/ kWh boiler Class 4 (1 credit), or <70mg/kWh boiler Class 5 (2 credits) or <40 mg/kWh (3 credits).	3/3 CREDIT TARGETED ALL CREDITS – targeted PRE-ASSESSMENT It has been assumed that the proposed space and hot water heating system will be low NO_x and have a NO_x emissions level of <40 mg/kWh. M&E to confirm	M&E
Pol 02	Surface Water Run-off	3	0.75	1 (3)	First credit – neutral impact on surface water 1. Where there is no change in the size of the building footprint or hard standing as a result of the refurbishment 2. Where any new hard standing areas are permeable, this must include all new pavements, driveways and where applicable public rights of	1/1 CREDIT TARGETED FIRST CREDIT – targeted PRE-ASSESSMENT Based on an initial review of the existing and proposed site plan it has been assumed that there	Civil

					way, car parks and non-adoptable roads (e.g. community scale refurbishment projects). 3. Where the building is being extended onto any previously permeable surfaces, or an impermeable surface that drains onto a permeable surface (e.g. paving slabs set on concrete that drained onto soft landscaped areas) the additional run-off for rainfall depths up to 5 mm caused by the area of the extension must be managed on site using appropriate Sustainable Drainage Systems (SuDS) such as Soakaways. 4. Any calculations necessary to demonstrate that criterion 2 will be achieved should be carried out by an Appropriately Qualified Professional (AQP) see CN6.	is no change in size of building footprint and new hardstanding areas will be permeable.	
					Second credit – reducing run-off from site: basic 5. Where criteria 1, 2 and 3 have been achieved. 6. Where all run-off from the roof for rainfall depths up to 5 mm, have been managed on site using source control methods (e.g. through infiltration, soakaways etc.). This should include runoff from all existing and new parts of the roof. 7. Where required, an appropriately qualified professional should be used to design an appropriate drainage strategy for the site, ensuring criterion 1 is achieved	0/1 CREDIT TARGETED SECOND CREDIT – not targeted PRE-ASSESSMENT Due to the site physical constraints it has been assumed that this credit will not be achievable (1 POTENTIAL ADDITIONAL CREDIT – drainage consultant to confirm)	N/A
					Third Credit – reducing run-off from site: advanced 8. An appropriately qualified professional should be used to design an appropriate drainage strategy for the site.	0/1 CREDIT TARGETED THIRD CREDIT – not targeted PRE-ASSESSMENT	N/A

					9. Where run-off as a result of the refurbishment is managed on site using source control achieving the following requirements: a. The peak rate of run-off as a result of the refurbishment for the 1 in 100-year event has been reduced by 75% from the existing site. b. The total volume of run-off discharged into the watercourses and sewers as a result of the refurbishment, for a 1 in 100-year event of 6-hour duration has been reduced by 75%. c. An allowance for climate change must be included for all of the above calculations, in accordance with the current best practice (PPS25, 2010).	Due to the site physical constraints it has been assumed that this credit will not be achievable (1 POTENTIAL ADDITIONAL CREDIT – drainage consultant to confirm)	
Pol 03	Flooding	2	0.75	0 or 2	Two Credits - low flood risk or flood mitigation Minimum standards 1. A minimum of two credits must be achieved for this issue at the Excellent and Outstanding levels Option 1 – Low flood risk 2. Where a Flood Risk Assessment (FRA) has been carried out and the assessed dwellings are defined as having a low annual probability of flooding. Option 2 – Medium/High Flood Risk 3. Where a Flood Risk Assessment (FRA) has been carried out and the assessed dwellings are defined as having a medium or high annual probability of flooding. 4. Two credits are awarded where as a result of the dwellings floor level or measures to keep water away the dwelling is defined as achieving avoidance	2 CREDITS MANDATORY TO ACHIEVED BREEAM EXCELLENT 0/2 CREDIT TARGETED (Very Good Dwellings) 2/2 CREDIT TARGETED (Excellent Dwellings) ALL CREDITS – targeted PRE-ASSESSMENT The Environment Agency flood mapping confirms that the site is in Flood Zones 1, 2 and 3. To achieve BREEAM Excellent mitigation measures must be designed to ensure flood risk is alleviated. It is assumed that the basement and ground floor dwellings will be below the flood level and will therefore not be able to achieve this credit.	Civil / FRA

					from flooding by following Checklist A-10; Decision Strategy Flow Chart. 5. Where avoidance is not possible, two credits are achieved where a full flood resilience/resistance strategy is implemented for the dwellings in accordance with recommendations made by a Suitably Qualified Building Professional	NOTE – 2 credits are mandatory to achieve BREEAM Excellent.	
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4. PERFORMANCE SUMMARY

The pre-assessment process identified the credits and consequent ratings likely to be achieved by the proposed residential redevelopment at Gas Works Road, Reading.

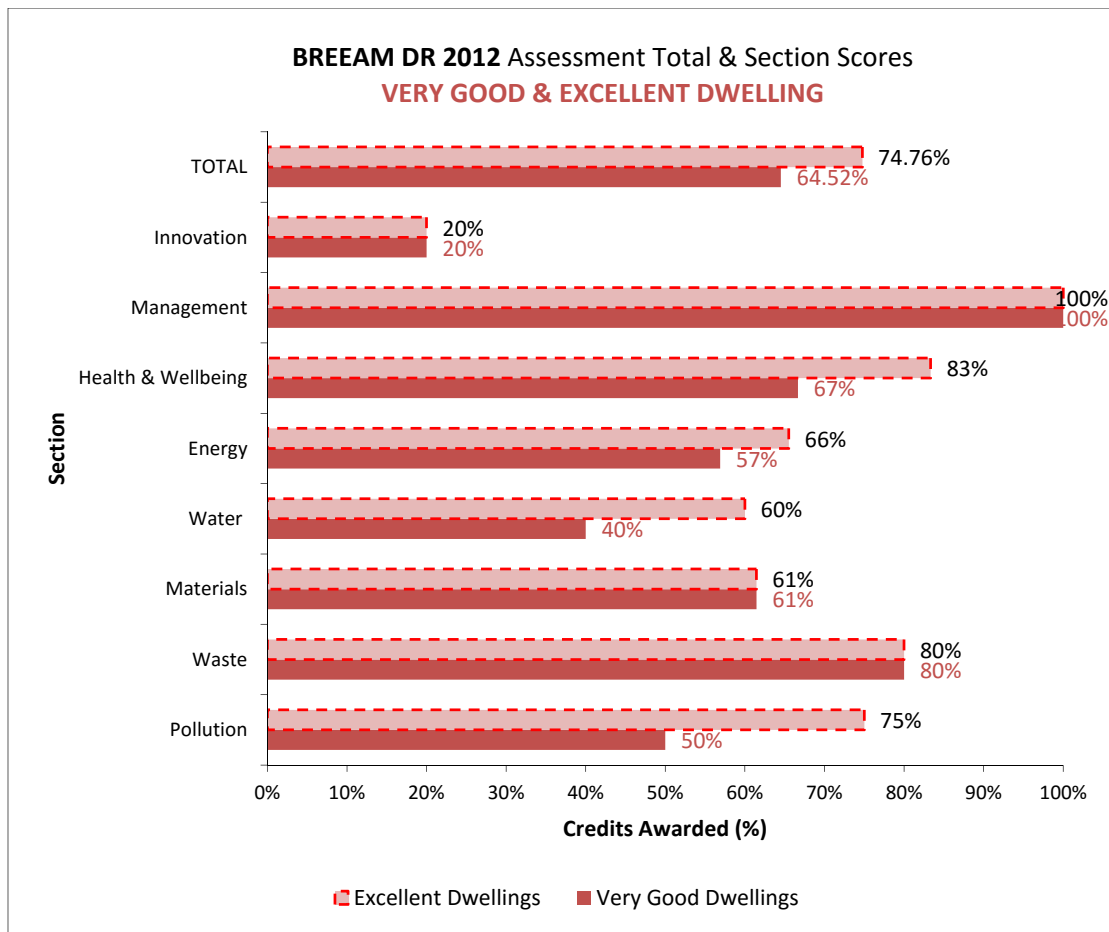


Figure 4.1: Predicted Percentage of the Total Score Targeted and a Breakdown of the Percentage of Credits Awarded in each Section for the development. The potentially improved score, taking in consideration opportunities nominated in Section 6, is shown dashed.

The proposed dwellings are likely to achieve either a *BREEAM 'Very Good'* rating or *BREEAM 'Excellent'* rating, given current design intent: the '*Very Good Dwellings*' are likely to achieve a total overall score of 64.52% and the '*Excellent Dwellings*' are likely to achieve a total overall score of 74.76%.

5. OPPORTUNITIES FOR IMPROVEMENT

Table 5.1 identifies those credits that are considered unlikely to be achievable for all elements of the proposals due to the nature and location of the development.

Table 5.1: Unlikely Credits		
Credit	Credit Description	Comment
Hea 04	Inclusive Design	Due to the existing building and site constraints it is unlikely to be able to achieve level access to any of the dwellings nor provide lifts within the buildings.
Wat 03	Water Meter	Due to the inherent properties of apartment buildings it is unlikely that the individual dwellings will be able to have individual meters installed

Table 5.2 below identifies those credits that can be considered to improve the overall BREEAM score if required at a later stage in design. The arrow gives an indication of the benefit in achieving each credit taking the credit weightings into consideration. In addition, Column 4 details the associated BREEAM score increase as a result of implementing the relevant opportunity for improvement (this can be added to the current predicted score in order to determine a revised total). When considering the potential for improvement to the BREEAM score, it is recommended that those credits which are presented lower down the table will provide less benefit than those higher up.

Table 5.2: Opportunities for Improvement				
Credit	Credit Description	Comment	Potential BREEAM credits	
Ene 04	Renewable Technologies	2 additional credit are available if the community heat network is powered by a biomass boiler or CHP	+ 2.96	GREATEST BENEFIT  LEAST BENEFIT
Pol 02	Surface Water Run-Off	2 additional credits can be achieved if the peak run-off rate as a result of the refurbishment for a 1 in 100-year event can be reduced by 75% from the existing site	+ 1.50	
Ene 05	Energy Labelled White Goods	1 additional credit if washing machines, dishwashers, tumble dryers and washer dryers are installed by the developer and appropriately rated	+ 1.48	

Points to note:

As this pre-assessment has been undertaken in the early stages of design, much of the required evidence base has not been finalised. It is quite likely that due to changes in design or a lack of necessary evidence at the later design stages, there may be credits which are not awarded during the design stage assessment, which is when the BREEAM Interim Certificate is issued. Therefore, it is recommended that re-appraisal of designs against BREEAM requirements, as the designs are developed, is regularly undertaken to ensure that credit opportunities are not lost.

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 (RIBA Stages A – G).

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 (see Appendix 1 for a list of the required evidence base). 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 to receive 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

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.

Appendix 1: 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 NO_x emissions. Boilers are classified on a scale of 1 to 5, with 1 indicating high NO_x emissions through to relatively low NO_x 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 associated 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.