THORNE & DERRICK UK

Tel: +44 (0)191 490 1547
Fax: +44 (0)191 477 5371
Email: northernsales@thorneandderrick.co.uk
Website: www.heattracing.co.uk
www.thorneanderrick.co.uk

BREEAM®

Scheme Document
SD 5051

BREEAM Education 2008

BRE Global Limited (part of the BRE Group) is an independent third party approvals body offering certification of fire, security and sustainability products and services to an international market.

And we aim to achieve this by:

- Researching and writing standards
- Testing and certification in the areas of fire, electronics, security and sustainability
- Developing world leading environmental assessment methods
- Undertaking research and consultancy for clients and regulators
- Promulgating standards and knowledge throughout the industry through publications and events
- Developing and delivering training

BRE Global's product testing and approvals are carried out by recognised experts in our world renowned testing laboratories.

BRE Global Limited is custodian of a number of world leading brands including:

LPCB for approval of fire and security products and services

BREEAM the world's leading environmental assessment method for buildings, sets the standard for best practice in sustainable design and has become the de-facto measure of a building's environmental performance.

BRE Global is a trading subsidiary of the BRE Trust, the registered research and education charity which owns the BRE Group.

BRE Global Limited
Bucknalls Lane
Watford
Hertfordshire
WD25 9XX
T +44 (0)1923 664100
F +44 (0)1923 664910
E enquiries@breglobal.com
www.breglobal.com
www.greenbooklive.com

BRE Global

Contents

List of Tables

Changes to this BREEAM Scheme Document

A list of changes between this issue of the Scheme Document and previous issues is published in section 15 of this document.

Issue number	Date of issue
1.0	24/6/2008
2.0	14/08/2008
3.0	31/07/2009
4.0	01/05/2010
4.1	25/05/2012

Note: The scope of BREEAM Education 2008 was expanded in July 2009 to allow for the assessment of **Higher Education Building types**. This resulted in the addition of new BREEAM issues and requirements (from issue 3.0 of this scheme onwards) specific to this type of building/development. As a result of this additional development to this BREEAM scheme, some of the assessment issues and criteria for higher education building types are different to the criteria set for schools, sixth form and further education colleges. Several of these differences are due to the specific function and operational requirement/use of a higher education building, whilst other difference are purely a result of the development and addition of BREEAM for higher education building types occurring post-BREEAM 2008 update and release. The BREEAM 2008 assessment criteria for schools, sixth form and further education colleges have not been changed as a result of the development and inclusion of BREEAM for higher education buildings in to the BREEAM Education scheme. This is to ensure that the 2008 version of BREEAM Education for these types of education establishments remains consistent for all projects registered and certified under BREEAM 2008.

.

Terms and conditions for accessing the BREEAM Scheme Documents

By accessing or using this website (www.breeam.org), you agree to these terms and conditions of use.

Data Protection Act 1998

The Data Protection Act defines the legal responsibilities of data users such as ourselves. The Act governs the collection, storage, use and transfer of personal data, for example, name, address, email, age, etc.

Accuracy, Use and Feedback

We are committed to respecting the privacy of users entering this site and we recognise the importance of the responsible use of information collected on this site. We will do our best to maintain the accuracy of the personal information you supply to us. You have the right to access and correct your personal information at any time and if you wish to do so please contact us at breeam@bre.co.uk. We will not sell or rent your personally identifiable information to anyone. On our website we may provide space for your comments and/or provide a short survey for you to complete. This is used only to help us refine the content and relevance of our website. It is not re-used or re-applied for any other purpose.

Cookies

We may track your visit to our site by giving you a cookie when you enter. Cookies are pieces of information sent to your browser on a web server and stored on your computer's hard drive for record keeping purposes. We use Cookies to make visiting our site easier. Cookies allow us to save passwords for you so that you will not have to re-enter them the next time you visit. Cookies cannot be used to obtain other information from your hard disk. The Cookie is used to collect statistical information and is not used to identify individuals.
Most browsers are initially set up to accept Cookies. If you prefer you can reset your browser either to notify you when you have received a Cookie or to refuse to accept Cookies.
It is important to note that if you choose not to accept Cookies, or you set your browser not to accept Cookies, you may not be able to use certain features on our site.

Aggregate Data

In general, our service automatically gathers certain usage information about the numbers and frequency of visitors to our website. We only use such data as aggregate. This collected data helps us to determine how much our customers use parts of the site, so we can improve our site for your use.

IP Address

We may collect and track traffic by IP address. An IP address is a number assigned to your computer when you use your browser on internet. We log this information, but this information is never linked to any personally identifying information. It is used to audit the number of visitors coming to our website.

Privacy Policy Changes

If we decide to change our Privacy Policy, we will post those changes here so that you will always know what information we gather, how we might use that information and whether we will disclose it to anyone.

Disclaimer

BRE does not accept any responsibility for any loss or damage including, without limitation, indirect or consequential loss or damage, or any loss or damages whatsoever arising from use or loss of use of, data or profits arising out of or in connection with the use of BRE websites. BRE does not guarantee that access to and use of BRE websites will be uninterrupted or error-free.

Mention of third party products, services, companies and websites on any BRE website is for informational purposes only and constitutes neither an endorsement nor a recommendation. BRE's websites hold a wide range of links to related websites from a variety of related organisations, companies and services. While every effort is made to check the content and accuracy of the websites we link to, BRE takes no responsibility for information contained on websites maintained by other organisations or for action taken as a result of information contained on websites maintained by other organisations.

Copyright

The information and images contained on our websites are the property of BRE unless explicitly stated to the contrary. They are protected by copyright laws. Material may be downloaded free of charge or printed without requiring specific permission but remains the intellectual property, technical know how and copyrighted material of BRE. Such material is not to be used in a derogatory manner, in a misleading context or for commercial purposes. If the material is being issued to others, the source including the web address and copyright status must be acknowledged. We may require you to register your details before downloading certain information or documents.

Trade Marks

BRE, BREEAM, EcoHomes, Smartwaste, SmartLIFE, Envest, the Green Guide, and Insight are all registered trade marks owned by BRE and may not be used without BRE's written permission.

Governing Law

These terms and conditions shall be governed by and construed in accordance with the laws of England and Wales. Any dispute arising under these terms and conditions shall be subject to the exclusive jurisdiction of the courts of England and Wales.

1.0 Introduction

1.1 What is BREEAM?

BREEAM (Building Research Establishment's Environmental Assessment Method) is the world's leading and most widely used environmental assessment method for buildings, with over 115,000 buildings certified and nearly 700,000 registered. It sets the standard for best practice in sustainable design and has become the de facto measure used to describe a building's environmental performance. Credits are awarded in ten categories according to performance. These credits are then added together to produce a single overall score on a scale of Pass, Good, Very Good, Excellent and Outstanding. The operation of BREEAM is overseen by an independent Sustainability Board, representing a wide cross-section of construction industry stakeholders.

Aims of BREEAM:

- To mitigate the impacts of buildings on the environment
- To enable buildings to be recognised according to their environmental benefits
- To provide a credible, environmental label for buildings
- To stimulate demand for sustainable buildings

Objectives of BREEAM:

- To provide market recognition to low environmental impact buildings
- To ensure best environmental practice is incorporated in buildings
- To set criteria and standards surpassing those required by regulations and challenge the market to provide innovative solutions that minimise the environmental impact of buildings
- To raise the awareness of owners, occupants, designers and operators of the benefits of buildings with a reduced impact on the environment
- To allow organisations to demonstrate progress towards corporate environmental objectives

1.2 Governance and Quality Standards

The BRE Global “Sustainability Board” oversees BRE Global’s guides, publications, standards and certification schemes in the area of sustainability and the environment.

Current standards and schemes include BREEAM, Environmental Profiles, Responsible Sourcing and ISO 14001. One of the main responsibilities of this Board is to ensure that standards, scheme documents and the way BRE Global operates meet the needs of stakeholders. The Board meets three times a year to review these issues.

The Sustainability Board reports to the BRE Global Governing Body, which has an independent overview of all BRE Global's schemes and activities. Specific responsibilities of the Sustainability Board and other Boards include:

- advising on the need for new standards, certification schemes and publications, including updates to existing ones
- advising BRE Global on relevant legislation and technical matters
- promoting certification
- advising on issues that may affect the reputation and integrity of BRE Global
- approving certification schemes, standards, publications or approvals and reviewing outputs from Expert Groups and Working Groups
- ensuring a balanced participation with no single interest predominating
- providing comments and guidance, where appropriate, on methods of assessment and testing, to review the progress of assessments and advise on content of certificates, prior to publication; and
- reviewing and advising on complaints and appeals as requested.

The Board represents a wide cross section of stakeholders from the construction industry including designers, developers, end users, financiers, insurers and regulators. The first independent chairman elected by the members is Bill Gething. Bill is one of the most respected figures in sustainable architecture and is the RIBA President's Sustainability Advisor, Chair of the Institute's Sustainable Futures Committee and a partner of Feilden Clegg Bradley Architects LLP.

ISO 9001

BRE Global has ISO 9001 certification for its BREEAM Buildings schemes and also for the assessment and certification of construction materials under the BREEAM LCA (Life Cycle Analysis) environmental profiles. The certification for the BREEAM schemes covers the operations relating to assessor training, licensing, quality management, and record keeping.

UKAS Accreditation

Assessors qualified to deliver the BREEAM buildings schemes are also covered under a UKAS accredited competent persons scheme. In addition, the operations relating to the certification of the BREEAM buildings versions and the environmental profiles are also covered under UKAS accredited product certification schemes.

1.3 BREEAM Credibility

Technical Credibility

BREEAM is tried and tested, both in terms of its robust technical standards and its commercial delivery, and expert advice (based on scientific evidence) continues to inform almost every issue in BREEAM.

In the UK there are over 115,000 buildings certified and over 700,000 homes and buildings currently registered for assessment. BREEAM can be used to assess any building type anywhere in the world.

Robust Technical Standards

BREEAM has always used objective criteria to recognise good environmental performance:

- Issues for assessment are agreed to be significant, and offer worthwhile reductions in environmental impact
- Issues must be assessable at the relevant stage in the building's life
- Performance levels are based on scientific evidence wherever possible
- Performance levels must exceed demands of law and regulations and encourage innovation
- Improvements encouraged by BREEAM are achievable and cost effective

Where specific targets cannot be set using hard science or research, sensible practical measures are recommended to minimise environmental impact or enhance the environment of the building and its users.

Commercial Credibility

Assessments are undertaken by organisations and individuals trained and licensed by BRE Global (Assessors). This ensures:

- Competition in the market for assessment services
- Engagement with the whole of the industry
- Assessors work to the same quality standards (monitored by BRE Global)

BRE Global has gained UKAS (United Kingdom Accreditation Service) accreditation for all its BREEAM schemes. This means that its management of BREEAM is monitored and overseen by UKAS.

1.4 The BREEAM Scheme Document

The following BREEAM Scheme Documents i.e. Assessor manuals are available for free download from the BREEAM website:

- BREEAM Courts
- BREEAM Education
- BREEAM Industrial
- BREEAM Healthcare
- BREEAM Offices
- BREEAM Retail
- BREEAM Prisons
- BREEAM Multi-residential
- BREEAM Data Centres

What is in the BREEAM Scheme Documents?

- A definition of the scope of the BREEAM scheme
- Full information on the technical standards and criteria of the scheme (summarised below)
- Rating & scoring information
- Technical checklists

Using the BREEAM Scheme Documents

The BREEAM Scheme Documents are technical guidance documents which have been created to aid accredited and licensed BREEAM Assessors in carrying out BREEAM assessments. Please note that a scheme document and the information detailed therein have been designed for, and to be used by trained, qualified and licensed BREEAM Assessors.

This document must be used by non assessors for reference only (in accordance with the Terms and Conditions of use).

Understanding the BREEAM Scheme Documents

This BREEAM scheme covers ten categories of sustainability including:

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

Each category is detailed in this Scheme Document and consists of a number of issues (summarised below). Each issue seeks to mitigate the impact of a new or refurbished building on the environment by defining a performance target and assessment criteria that must be met to confirm the target has been achieved. Where a performance target has been achieved the number of available BREEAM credits can be awarded.

Table 1 Summary of BREEAM categories and main issues

Management • Commissioning • Construction site impacts • Security	**Waste** • Construction waste • Recycled aggregates • Recycling facilities
Health and Wellbeing • Daylight • Occupant thermal comfort • Acoustics • Indoor air and water quality • Lighting	**Pollution** • Refrigerant use and leakage • Flood risk • NO_x emissions • Watercourse pollution • External light and noise pollution
Energy • CO_2 emissions • Low or zero carbon technologies • Energy sub metering • Energy efficient building systems	**Land Use and Ecology** • Site selection • Protection of ecological features • Mitigation/enhancement of ecological value
Transport • Public transport network connectivity • Pedestrian and Cyclist facilities • Access to amenities • Travel plans and information	**Materials** • Embodied life cycle impact of materials • Materials re-use • Responsible sourcing • Robustness
Water • Water consumption • Leak detection • Water re-use and recycling	**Innovation** • Exemplary performance levels • Use of BREEAM Accredited Professionals • New technologies and building processes

The performance targets go beyond the minimum standard needed to satisfy Building Regulation or other legislation. The targets represent good or best practice in the field of sustainable design and procurement.

The majority of BREEAM issues are tradable, meaning that a design team/client can pick and choose which to comply with in order to build their BREEAM performance score. Several BREEAM issues do

have minimum standards meaning that, to achieve a particular BREEAM rating, a defined number of credits for that issue must be achieved (BREEAM's minimum standards are outlined in section 3.0 Scoring and Rating).

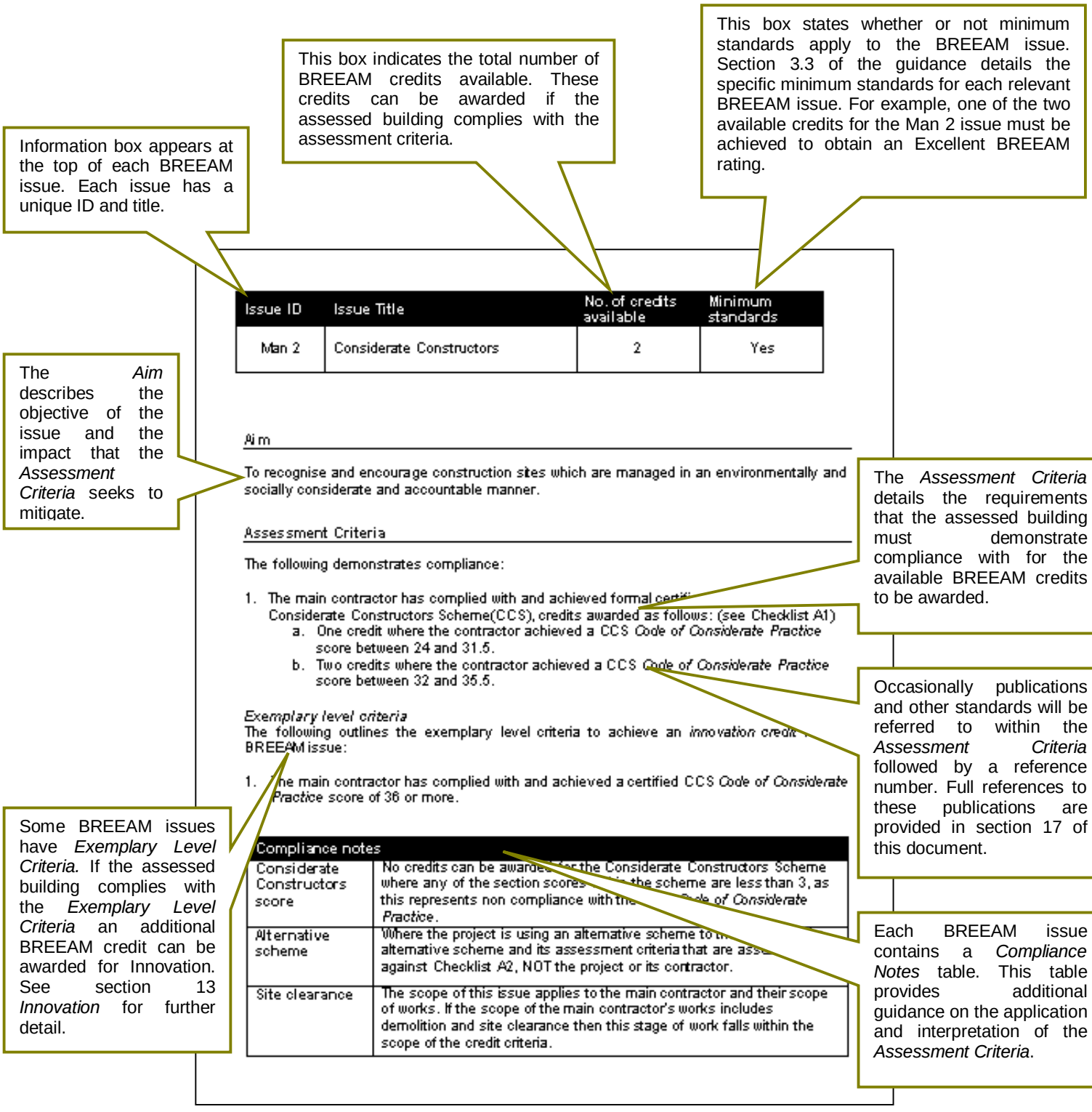
Each BREEAM issue is structured as follows:

- **Issue Information**: Issue ID, issue title, number of credits available for meeting the performance target and whether the issue forms part of BREEAM's minimum standards.
- **Aim**: Broadly outlines the objective of the issue i.e. the impact it intends to mitigate
- **Assessment Criteria**: outlines the building performance target/benchmark and its criteria. Some issue have *Exemplary Level Criteria.* Where a building demonstrates that it meets *Exemplary Level Criteria* an Innovation Credit can be awarded (refer to section 13 *Innovation* for more detail)
- **Schedule of Evidence Required**: outlines typical examples of the type of information that must be collected from the design team/client by the BREEAM assessor so they can assess if the building complies with the issue criteria.
- **Additional Information**: details relevant definitions of BREEAM terminology and contains information to support the assessment and compliance of the building.

The following pages contain an example BREEAM issue.

Example of a BREEAM Issue

Please note: this BREEAM issue has been edited for the purpose of demonstration.



The *Schedule of Evidence Required* table describes the types of information that must be provided to the BREEAM assessor as evidence of the assessed building's compliance with the *Assessment Criteria.*

The *Schedule of Evidence* table is split in to two sections. The first details the type(s) of evidence required at the interim design stage of assessment. The second describes the type(s) of evidence required at the final post construction stage of assessment. The numbers in the table correspond to the numbered assessment criteria in the above sections.

Schedule of evidence required

Req.	Design Stage	Post Construction Stage
1	A copy of the relevant section of the main contract specification confirming: ▪ A requirement to comply with the CCS ▪ The minimum score to be achieved in each CCS section. OR A formal letter from the client/developer confirming: ▪ The main contract will include a clause requiring CCS certification ▪ The scope of the main contractor's works ▪ A completed copy of checklist A1.	A copy of the Considerate Constructors Scheme certificate of compliance. The Considerate Constructors Monitors report highlighting the total score and the sub scores in each section.
Exemplary Credit		
1-2	A formal letter from the main contractor confirming their commitment to: ▪ Gaining CCS or equivalent certification ▪ A minimum score of ≥36 or equivalent.	Evidence as outlined above for req.1.

Additional information

Relevant definitions

Considerate Constructors Scheme is a UK certification scheme that encourages the considerate management of construction sites. The scheme is operated by the Construction Confederation and points are awarded in increments of 0.5 over the following eight sections:

- Considerate
- Environmentally Aware
- Site Cleanliness
- Good Neighbour
- Respectful
- Safe
- Responsible
- Accountable

To achieve certification under t[illegible]cheme a score of at least 24 is required.

www.consideratecon[illegible].uk

The *Additional Information* section contains definitions of terms used in the *Assessment Criteria* and *Compliance Notes* section. This section will also contain further information relevant to the issue e.g. assessment guidance and relevant websites

2.0 Scope

This section of the guidance outlines the scope of this non-domestic BREEAM scheme and the type of buildings that it can be applied to. The following information is provided in this section:

- The BREEAM assessment and certification stages
- Type of building projects that can be assessed using BREEAM
- Type of buildings that can be assessed using this BREEAM scheme

Non-domestic BREEAM schemes can be used to assess the environmental impacts of a building in accordance with this scope document in England, Scotland, Wales and Northern Ireland. Assessments using UK BREEAM schemes can also be carried out in the Republic of Ireland, but it must be recognised that BREEAM is tailored to the UK's construction sector. No concessions are made in the schemes where the Republic of Ireland building standards and design and procurement practices differ from those in the UK.

Where the building requiring assessment does not fall within the scope of this non-domestic BREEAM scheme or one of the other BREEAM schemes (domestic or non-domestic) or Code for Sustainable Homes, it can be assessed using the BREEAM *Bespoke* scheme.

Where the building requiring assessment is outside of the UK it can be assessed using the BREEAM *International* scheme; this includes buildings in the Republic of Ireland where it is not appropriate to use a UK scheme. BREEAM *International* can be used to assess a single development or BRE Global can assist in creating a BREEAM scheme for a country or region.

Further information on the BREEAM *Bespoke* and BREEAM *International* schemes is available at www.breeam.org or via the BREEAM helpdesk breeam@bre.co.uk

2.1 Stages of assessment

This BREEAM scheme can be used to assess the environmental impacts arising as a result of an individual building development (including external site areas) at the following stages:

1. Design Stage (DS) - leading to an Interim BREEAM Certificate
2. Post-Construction Stage (PCS) – leading to a Final BREEAM Certificate

Design Stage

The DS assessment and subsequent interim BREEAM Certification represents the performance of the building at the design stage of assessment, typically prior to the beginning of operations on site. Certification at this stage does not, therefore, represent the building's final 'as built' BREEAM performance.

To complete an assessment at this stage the design must be advanced to the point where the relevant information is available to enable the BREEAM assessor to demonstrate, in a robust manner, the building's performance against the reporting and evidential criteria of the technical guidance. The interim DS assessment will therefore be completed and certified at the scheme design or detailed design stages.

Post-Construction Stage

The PCS assessment and subsequent BREEAM Certification represents the final 'as built' performance and BREEAM Rating. A final PCS assessment is completed and certified after practical completion of the building works.

There are two approaches to assessment at the post-construction stage:

1. A post-construction review of an interim design-stage assessment
2. A post-construction assessment

A post-construction review serves to confirm the interim BREEAM rating achieved at the design stage in accordance with the reporting and evidential criteria of the technical guidance. Where a formal interim DS assessment has not been carried out and a BREEAM assessment and rating is required, a full PCS assessment can be conducted.

2.2 Type of projects that can be assessed using BREEAM

A BREEAM assessment can be carried out at the above stages for the following types of building project:

- New Construction
- Major refurbishment to existing buildings
- New construction to an existing building i.e. an extension of existing building
- A combination of new construction and major refurbishment to an existing building
- New construction or major refurbishment, which forms part of a larger mixed use building
- Existing building fit-out

New construction

Construction that results in a new stand alone structure, or extension to an existing structure, which will come into operation/use for the first time upon completion of the works.

Major refurbishments to existing buildings

Construction that results in the fundamental remodelling or adaptation of existing *elements* of the building envelope, structure and renewal of key building services. And where, on completion of the works, such remodelling / renewal will materially impact on the performance of the building.

The term *elements* include:

a. Structural/building envelope elements including walls (including glazing), roofs (including rooflights) and floors.
b. Building services elements including lighting (artificial and daylighting), heating, mechanical ventilation/cooling plant and ductwork, water/drainage systems.

For the purposes of this definition works to both A and B above must be taking place for the project to be classed as a major refurbishment. Where only individual elements of the structural/building envelope element (e.g. windows or doors), or individual services elements (e.g. a boiler, heating system or lighting installation) are being replaced, remodelled or upgraded, then, the project should not be classed a major refurbishment (see minor refurbishment guidance below).

It should be noted that all major refurbishment projects will reuse the majority of the buildings existing supporting sub and superstructure and it is likely that in many cases the building façade will be retained, albeit with some remediation or renovation.

Minor refurbishment, remodelling or redecoration

This BREEAM Scheme and the requirements it sets are predominantly designed to assess the environmental impacts of buildings arising as a result of new and major refurbishment construction works (as defined above). The requirements are therefore tailored according to the opportunities available to influence a buildings environmental performance when major construction work is undertaken. Unless otherwise stated, this scheme is not intended for the assessment of existing buildings undergoing minor remodelling or redecoration works. Existing building fit out works can be assessed within a number of sector schemes including *Offices, Retail, Industrial, Education, Healthcare* and *Bespoke* schemes (see *Building fit-out* below).

If there is uncertainty over the appropriateness of applying BREEAM to existing building works that do not meet BREEAM's definition of major refurbishment, advice can be sought from and the decision informed by a BREEAM Accredited Professional or BREEAM Assessor.

New build extensions to existing buildings

BREEAM can be used to assess new build extensions to existing buildings and, where the existing building is undergoing major refurbishment, the new build extension and existing building.

When assessing only a new-build extension to an existing building, in some BREEAM issues it is necessary to consider services/facilities within the existing building, where such services/facilities will be integral to the new extension or used by the occupants of the new extension. Assessment guidance is provided in the *Compliance Notes* table within the specific BREEAM issue for such instances, where relevant.

Building Fit-out

BREEAM can be used to assess a fit out of an existing building. An assessment can be carried out on the first fit-out of the shell of a new building/unit or subsequent re-fit of an existing building/unit. A building fit-out can be certified at the interim stage, based on the fit-out design and specification and/or post fit-out based on an assessment of the actual finished, fitted-out unit/building.

The methodology for a fit-out assessment includes issues core to the BREEAM assessment and rating of a building. This includes the assessment of building-related impacts that may not be affected by the scope of the fit-out works. This approach serves to highlight the intrinsic environmental performance of the existing building/unit and recognise the opportunity that a fit-out presents to improve the environmental performance of an existing building.

In the technical guidance the assessment criteria for a building fit-out, for the most part, is the same as that for a new build/major refurbishment assessment. In some BREEAM issues there is building '*fit out only assessment'* criteria, including; *Construction Site Impacts*, *Materials Specification, Responsible Sourcing* and *Construction Site Waste Management;* and some issues contain *fit out* only compliance

notes and guidance. Furthermore, some BREEAM issues are not applicable to *fit-out only* assessments, including; *Land Use and Ecology, re-use of facades and structure, recycled aggregates* and *Flood Risk*.

Fit Out related BREEAM issues – The following lists the typical BREEAM issues which are either specific to, or contain criteria that rely on or influenced by a fit out of a building. Please note that there may be other issues that are relevant in certain circumstance.

Man 1 – Commissioning
Man 4 – Building User Guide
Hea 1 - Daylighting
Hea 2 – View Out
Hea 3 – Glare Control
Hea 4 – High Frequency Lighting
Hea 5 – Internal and External Lighting Levels
Hea 6 – Lighting Zones & Controls
Hea 9 – Volatile Organic Compounds
Hea 10 – Thermal Comfort
Hea 11 – Thermal Zoning
Hea 12 – Microbial Contamination
Hea 13 – Acoustic Performance
Hea 14 – Office Space (Industrial & Retail schemes)
Ene 1 – Reduction of CO_2 emissions
Ene 2 – Sub-metering of substantial energy uses
Ene 3 – Sub-metering of high energy load and tenancy areas
Ene 4 – External Lighting
Tra 8 – Deliveries and Manoeuvring
Wat 1 – Water Consumption
Wat 4 – Sanitary Supply Shut Off
Wat 5 – Water Recycling
Mat 6 - Insulation
Wst 4 – Compactor Baler
Pol 1 – Refrigerant GWP – Building Services
Pol 2 – Preventing Refrigerant Leaks
Pol 3 – Refrigerant GWP – Cold Storage
Pol 4 – NOx emissions from heating source
Pol 7 – Reduction of night time light pollution
Pol 8 – Noise attenuation

Similar buildings (or units) on the same site

It is possible to assess a number of separate but similar buildings, or individual units within a larger building development, within one BREEAM assessor's report. This is subject to the following conditions:

1. The buildings/units must all be on the same site
2. The buildings/units must be of the same building type e.g. an office, with the same building functions/spaces and fitted out to a similar specification and therefore assessed using the same BREEAM issues
3. Each BREEAM issue must be assessed, and its credits awarded, based on the worst performing building/unit
4. The assessment and assessors report produces a single BREEAM rating covering all buildings/units assessed

For the above scenario, a single BREEAM certificate will be issued listing all the buildings/units covered by the single BREEAM assessor's report.

Where required, a duplicate of the certificate can be produced for the purposes of display in each individual building/unit. Duplicates of certificates are not chargeable provided they are requested by the BREEAM assessor along with the initial certification request to BRE Global.

Alternatively, a certificate can be produced specific to each individual building/unit. In such cases an additional charge will be made for each individual certificate requested.

In either case the certification criteria must be confirmed by the assessor on the Certificate Request Form submitted with their formal assessment report to BRE Global.

If one or more building/unit performs markedly better than another on the same site and the client wishes to recognise this, a separate BREEAM assessment and therefore certificate is required.

2.3 Type of buildings that can be assessed using this BREEAM scheme

BREEAM *Education* can be used to assess the following types of education buildings:

1. **Pre-School**, including;
   - Nursery schools[1]
   - Children's centres[2]

2. **Schools**, including;
   - Primary schools
   - Secondary schools (including those containing sixth form colleges)
   - All age-range schools (including education/teaching buildings at boarding schools)
   - Academies
   - Non-acute Special Educational Needs (SEN) schools

3. **Sixth Form Colleges**

4. **Further and Higher Education/Vocational Colleges and Institutions**, including;
   - Teaching facility
   - Learning Resource Centre
   - Laboratory / Workshop
   - Student Union
   - Or a mixture of the above types.

[1] Nursery school/education means full-time or part-time education suitable for children who have not attained compulsory school age (whether provided at schools or elsewhere), i.e. facilities/buildings for the teaching of children who are between the ages of two or three to five years old. If the building's sole purpose is to provide full/part day care facilities for children 2yrs old or younger i.e. a crèche, its assessment using the BREEAM *Education* scheme is unlikely to be appropriate.

[2] Children's centres are multi-agency service hubs where young children and their families can receive early education, full day childcare, parental support and child and family health services, such as access to health visitors and health screening. Children's centres will often be allied to a local primary school, on or adjacent to the school site.

The building functions/areas listed below are covered by the scope of BREEAM Education where they form a part of one of the above building types:

General educational specific areas

- Classrooms and seminar rooms
- Open plan teaching areas
- Lecture theatres
- Libraries
- Teaching laboratories
- Private study areas/rooms
- I.T. suites
- Play rooms
- Home economics/teaching kitchens
- Workshops
- Drama studios
- Music rooms
- Audio visual
- SEN Rooms
- Assembly Halls
- Student break out areas

Further and Higher Education specific areas

- General teaching and research laboratories (part of a H.E or F.E institution), including;
    - Wet and dry labs
    - Microbiological / clinical labs
    - *In vivo* labs
    - Cleanrooms
- Desk-based visual arts studios
- Large-scale visual arts studios, e.g. sculpture/photography/film/drama
- Multi-media recording studios and editing studios
- Trade-based workshops, e.g. salons, bricklaying, carpentry etc.
- Engineering/design based teaching and research workshops/studios
- 'Independent living' workshops/classrooms, e.g. childcare provision, support for physical disabilities, support for learning difficulties
- Recreational
- Retail unit, e.g. bookshop, convenience store

Office/staff areas

- Cellular or open plan offices
- Meeting rooms
- Staff rooms

Other associated functions/areas

- Sports Facilities, e.g. gymnasium, swimming pool etc.
- Conference rooms
- Reception and waiting areas
- Food preparation and servery
- Dining areas and common rooms
- Interview/counselling/medical rooms
- Crèche areas
- Restrooms, WCs and changing facilities
- Storage and waste management areas
- I.T. server room / data centre
- Ancillary areas e.g. plant room, circulation space

The above list is not exhaustive, but serves to indicate the type of spaces covered by the scope of this BREEAM scheme. Where a proposed building contains a small additional function/area that is not listed above, the building can still be assessed using this scheme. If the assessor has reason to believe that this scheme is not appropriate given the small additional function/area type, BRE Global can be contacted for advice.

Unless otherwise indicated, BREEAM Education cannot be used to assess any of the above *functions/areas* as standalone developments which are not part of an educational establishment. Such buildings can be assessed using one of the other standard BREEAM schemes or, where appropriate, the BREEAM Bespoke scheme.

All age range schools and academies

All age range schools and academies should normally be assessed using the guidance/criteria applicable to secondary schools. In some cases, for these types of education establishments, it may be more appropriate to use the assessment criteria for further education colleges or primary schools. For example, where an all age range school or academy will contain functional/operational areas more akin to those outlined above for further and higher education buildings or where the needs of the accommodation and occupiers are similar to those of primary or early years pupils. Based on the information received about the proposed building, the Assessor should determine the most appropriate BREEAM Education guidance/criteria to assess the building against. Where in doubt the Assessor should contact BRE Global for guidance

Acute SEN schools

Acute Special Educational Needs (SEN) refers to children with severe disabilities/learning difficulties that prevent them from interpreting their surroundings without feeling anxious or distressed. These children can become easily distracted and/or over-stimulated. This group of pupils mainly include children with a behavioural, emotional or social development disability (Behaviour, Emotional and Social Difficulty (BEDS)) and children with communication and interaction disability (Autistic Spectrum Disorder (ASD)).

Assessors carrying out assessments on schools for pupils with such needs will need to carefully consider all the BREEAM issues that might be affected by the need to provide special facilities for such building users, e.g. View Out, Cyclist Facilities, etc. and decide whether the BREEAM Bespoke scheme would be more appropriate for such assessments.

For more information on SEN please refer to Building Bulletin 102 *Designing for Pupils with Special Educational Needs and Disabilities*, published by the *Department for Children Schools and Families* (available from www.teachernet.gov.uk)

Boarding schools, Pupils' residential accommodation and student halls of residence

Residential accommodation cannot be assessed using BREEAM *Education*. The BREEAM *Multi-residential* scheme can be used to BREEAM assess and certify these building types.

Building does not fit the scope of BREEAM *Education*

Building types not covered by the scope of BREEAM *Education* and/or other standard BREEAM scheme can be assessed using the BREEAM *Bespoke* scheme.

3.0 Scoring and Rating

This section of the BREEAM Scheme Document explains how an assessed building's certified BREEAM rating is calculated.

There are a number of elements that determine the BREEAM rating; these are as follows:

- BREEAM rating benchmarks
- BREEAM environmental weightings
- Minimum BREEAM standards
- BREEAM credits for Innovation

Each of these elements is described in the sections on the following pages; this is followed by guidance and an example describing how a BREEAM rating is calculated.

In addition, there is a section describing the conditions that must be met in order to award an assessed building a 'BREEAM Outstanding' rating, the highest achievable BREEAM rating.

3.1 Rating benchmarks

The rating benchmarks for the 2008 version of BREEAM are outlined in table 2 below for new buildings, major refurbishments and, where applicable to the BREEAM scheme (refer to scope document), fit-out projects:

Table 2 BREEAM 2008 rating benchmarks

BREEAM Rating	% score
UNCLASSIFIED	<30
PASS	≥30
GOOD	≥45
V GOOD	≥55
EXCELLENT	≥70
OUTSTANDING*	≥85

* Please note: there are additional criteria for achieving a BREEAM Outstanding rating. Please refer to the guidance below.

3.2 Environmental section weightings

Table 3 below outlines the environmental weightings for the nine BREEAM sections for the type of building projects that BREEAM Buildings can be used to assess (refer to scope of the scheme document):

Table 3 BREEAM 2008 environmental weightings

BREEAM Section	Weighting (%)	
	New builds, extensions & major refurbishments	Building fit-out only (where applicable to scheme)
Management	12	13
Health & Wellbeing	15	17
Energy	19	21
Transport	8	9
Water	6	7
Materials	12.5	14
Waste	7.5	8
Land Use & Ecology	10	N/A
Pollution	10	11
Innovation	10	10

3.3 Minimum standards

To achieve a BREEAM rating, the minimum percentage score must be achieved (as outlined in table 2 above) and the minimum standards (i.e. number of credits achieved) applicable to that rating level (below) complied with.

Table 4 Minimum BREEAM standards

BREEAM issue	BREEAM Rating / Minimum number of credits				
	PASS	GOOD	VERY GOOD	EXCELLENT	OUTSTANDING
Man 1 - Commissioning	1	1	1	1	2
Man 2 - Considerate Constructors	-	-	-	1	2
Man 4 - Building user guide	-	-	-	1	1
Man 9 - Publication of building information (BREEAM Education only)	-	-	-	-	1
Man 10 - Development as a learning resource (BREEAM Education only)	-	-	-	-	1
Hea 4 - High frequency lighting	1	1	1	1	1
Hea 12 - Microbial contamination	1	1	1	1	1
Ene 1 - Reduction of CO_2 emissions	-	-	-	6	10
Ene 2 - Sub-metering of substantial energy uses	-	-	1	1	1
Ene 5 - Low or zero carbon technologies	-	-	-	1	1
Wat 1 - Water consumption	-	1	1	1	2
Wat 2 - Water meter	-	1	1	1	1
Wst 3 - Storage of recyclable waste	-	-	-	1	1
LE 4 - Mitigating ecological impact	-	-	1	1	1

BREEAM's minimum standards and minor refurbishment or fit out projects

BREEAM's minimum standards applicable to the PASS, GOOD and VERY GOOD rating levels may be exempt for smaller scale refurbishment or fit out (where applicable to scheme) projects where the

design/project team confirms the following to the BREEAM Assessor (who in turn will determine which of BREEAM's minimum standards apply[3]):

- That the project meets BREEAM's refurbishment/fit-out definition (see note 4 below)
- The proposed scope of works and budget
- That the scope of the works excludes the area/function to which the minimum standard(s) relate(see note 5 below)
- The approximate cost of complying with a particular minimum standard and therefore it's potential for feasibly complying given the projects scope/budget
- The environmental impact, if any, of ensuring the existing system/building will comply, when such works fall outside of the projects initial scope. For example; for issue Hea 4, having to replace/upgrade an existing but functioning lighting system that does not require replacement.
- The design team demonstrates what feasible measures, if any, they can and will take to meet the aim of the BREEAM issue, if not the criteria.

It should be noted that the relevant BREEAM assessment issues, for which there are minimum standards, are still applicable to all refurbishment and fit out projects and must still be assessed for compliance. The above exemption simply means that, if the credit for one of the issues is not feasibly achievable given the scope of the project, it will not prevent the building from achieving a PASS, GOOD or VERY GOOD rating.

The above exemption cannot be applied to those refurbishment or fit out projects seeking to achieve an Excellent or Outstanding rating i.e. to achieve the higher rating levels the project must comply with the minimum standards applicable to that rating level (as defined in the table above).

---

[3] The BREEAM Assessor will in turn need to identify the relevant issues to BRE Global, who will then provide an amended Assessment Tool for the specific project.

[4] Where the project is part new-build-part-refurbishment this policy can apply to the refurbishment element, provided it complies with the above. However, the new build element of the building must meet the relevant minimum standards.

[5] If for example the scope of the refurbishment work includes replacing sanitary fittings, then it would not be appropriate to exempt the project from the minimum standards for BREEAM issue Wat 1 *Water Consumption,* likewise for other BREEAM issues with minimum standards. Where feasible the project must comply with all, or the relevant minimum standards. The BREEAM Assessor will determine, based on the evidence provided to them by the project/design team, those minimum standards which can justifiably be exempt. Any exemption must be verifiable, in accordance with the above guidance and will be subject to BRE Global's BREEAM Quality Assurance procedures.

3.4 BREEAM credits for innovation

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

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

There are three different ways in which a building can achieve an Innovation credit (all of which are summarised below and detailed in section 13 *Innovation*). The first is by meeting exemplary performance criteria for an existing BREEAM issue (table 5 outlines the BREEAM issues with exemplary performance criteria).

Table 5 BREEAM issues with exemplary level criteria.

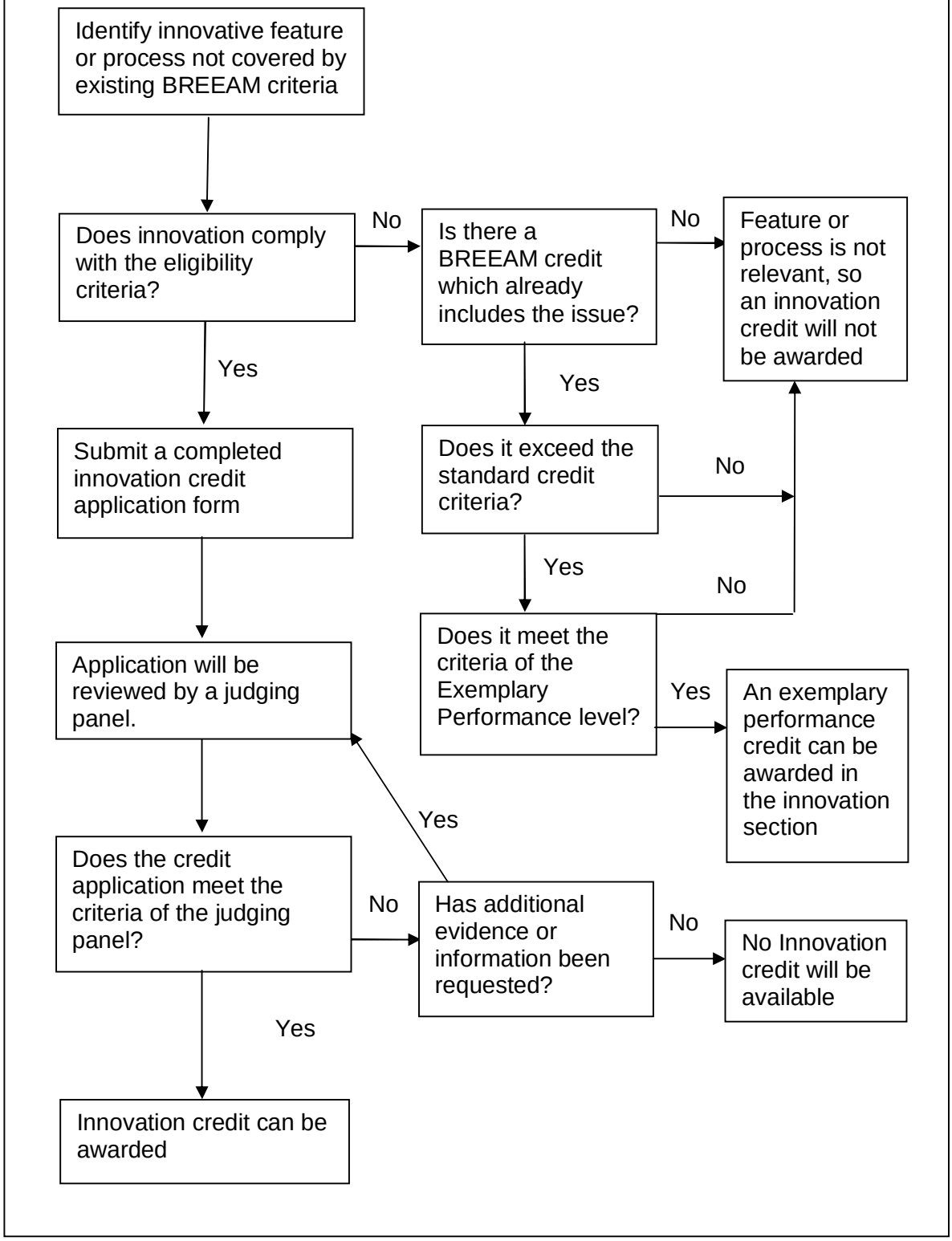
Man 2 - Considerate Constructors
Hea 1 - Daylighting
Hea 14 - Office Space (BREEAM Retail & Industrial Schemes only)
Ene 1 - Reduction of CO_2 emissions
Ene 5 - Low or Zero Carbon Technologies
Wat 2 - Water Meter
Mat 1 - Materials Specification
Mat 5 - Responsible Sourcing of Materials
Wst 1 - Construction Site Waste Management

The second route is where the client/design team sets a specific BREEAM performance targets/objectives and appoints a BREEAM Accredited Professional (AP) throughout the key project work stages to help deliver a building that meets the performance objectives and target BREEAM rating.

The final and third route is where an application is made to BRE Global by the BREEAM Assessor to have a particular building feature, system or process recognised as 'innovative'. If the application is

successful an Innovation credit can be awarded. The flow chart and eligibility criteria below outline the decision-making process to be used when applying for an Innovation credit (see also section 13 Innovation for further detail on the application and judging process). An additional fee is charged for each innovation credit application received.

BREEAM Innovation credit: application flow chart



3.5 Eligibility Criteria for Innovation Credits

The following criteria will be used to evaluate the eligibility of claims for proposed Innovation credit status:

1. Does the feature, system or process aim to reduce the building's impact on one of the following overarching environmental/social issues?

    - Mineral Resource Depletion
    - Fossil Fuel Depletion
    - Acidification
    - Climate Change
    - Nuclear Waste
    - Stratospheric Ozone Depletion
    - Eco-toxicity
    - Eutrophication
    - Human Toxicity
    - Photochemical Ozone Creation (Summer Smog)
    - Waste Disposal
    - Water Use
    - Deforestation
    - Urban Sprawl
    - Reduction of Biodiversity
    - Noise and Nuisance
    - Loss of Heritage
    - Indoor comfort
    - Health and Safety
    - Access and Inclusion

2. Can the impact of the feature, system or process be assessed objectively using clearly defined criteria?

3. Can the sustainability benefits of the feature, system or process be demonstrated?

4. Have a draft aim, assessment criteria and information required to demonstrate compliance been developed (in accordance with the Innovation credit application form)?

A BREEAM assessor can obtain the Innovation credit application form from the BREEAM Office at BRE Global or via the Assessor's Extranet. The form details the eligibility criteria listed above and the fee payable for each submitted application for an Innovation credit.

Innovation credits cannot be awarded until written approval is received from the BREEAM Office.

3.6 How to calculate a building's rating

A BREEAM assessor must determine the BREEAM rating using the BREEAM Assessor's Spreadsheet Tool and associated calculators. An indication of performance against the BREEAM scheme can also be determined using a BREEAM Pre-Assessment Estimator. The Pre-Assessment Estimators are available from the BREEAM website for each scheme.

The process of determining a BREEAM rating is outlined below and in table 6:

1. For each BREEAM section the number of credits awarded must be determined by a BREEAM assessor in accordance with BREEAM's assessment criteria (detailed in the technical sections of the Scheme Document).
2. The percentage of the credits achieved is calculated for each BREEAM section.
3. The percentage of credits achieved is then multiplied by the corresponding BREEAM section weighting (see note below). This gives the section score.
4. The section scores are then added together to give the overall BREEAM score. The BREEAM score is compared to the benchmarks in table 2 and, provided all minimum standards have been met, the relevant BREEAM rating is achieved.
5. An additional 1% can be added to the final BREEAM score for each Innovation credit achieved (up to a maximum of 10%).

Note: Where applicable to the BREEAM scheme (see *Scope of the BREEAM Scheme*), *Fit-Out only* assessments do not assess the BREEAM issues under the Land Use & Ecology section. The section weighting for Land Use and Ecology is re-distributed amongst the remaining eight sections. The re-distribution is determined based on the relative weighting of the remaining sections, so for example, the Energy section receives a greater proportion of the Land Use and Ecology weighting than the Water section. See Table 3 above for details of the respective section weighting.

Table 6 Example BREEAM score and rating calculation

BREEAM Section	Credits Achieved	Credits Available	% of Credits Achieved	Section Weighting	Section score
Management	7	10	70%	0.12	8.40%
Health & Wellbeing	11	14	79%	0.15	11.79 %
Energy	10	21	48%	0.19	9.05%
Transport	5	10	50%	0.08	4.00%
Water	4	6	67%	0.06	4.00%
Materials	6	12	50%	0.125	6.25%
Waste	3	7	43%	0.075	3.21%
Land Use & Ecology	4	10	40%	0.10	4.00%
Pollution	5	12	42%	0.10	4.17%
Innovation	1	10	10%	0.10	1%
Final BREEAM score				**55.87%**	
BREEAM Rating				**VERY GOOD**	

Minimum Standards for BREEAM 'Very Good' rating	**Achieved?**
Man 1 - Commissioning	**P**
Hea 4 - High frequency lighting	**P**
Hea 12 - Microbial contamination	**P**
Ene 2 Sub-metering of substantial energy uses	**P**
Wat 1 - Water consumption	**P**
Wat 2 - Water meter	**P**
LE 4 - Mitigating ecological impact	**P**

3.7 BREEAM Outstanding Rating

The following conditions must be met in order to certify a building at the Outstanding BREEAM rating level:

1. The building must achieve a final BREEAM Score ≥85%
2. The minimum performance standards (table 4) for the Outstanding rating level must have been met
3. Provision of material for the production and publication of a case study (refer to guidance below) on the Outstanding rated building.

In addition to the above, the 'BREEAM Outstanding' building is required to obtain a BREEAM In Use Certification of Performance within the first three years of the building's operation and use (with regular reviews in accordance with that scheme) in order to maintain the rating. Where the building is not certified against BREEAM In Use during this period, the Outstanding rating will be downgraded to an Excellent BREEAM rating after the expiry of the three years from issue of the Final BREEAM 2008 (Post Construction) certificate.

Production of case study

One of the most important aspects of the Outstanding BREEAM rating will be that projects receiving this rating will act as exemplars for the industry. It is therefore a very important aspect of the new rating that a good-quality case study is produced that design teams can refer to.

The design team and client will be asked via the certificate request form to agree to provide relevant building/project information to allow BRE Global to produce a case study. This information will be required with the formal post construction stage BREEAM assessor's report for the assessed building.

Subject to approval from the design team/client, BRE Global will publish the case study on either the BREEAM website, Green Book live website and other BRE/BREEAM-related publications (as appropriate).

Where information is not provided for the production of a case study, the building will be certified to a BREEAM Excellent rating level.

4.0 Management

Issue ID	Issue Title	No. of credits available	Minimum standards
Man 1	Commissioning	2	Yes

Aim

To recognise and encourage an appropriate level of building services commissioning that is carried out in a co-ordinated and comprehensive manner, thus ensuring optimum performance under actual occupancy conditions.

Assessment Criteria

The following demonstrates compliance:

First credit

1. An appropriate project team member(s) is appointed to monitor and programme pre-commissioning, commissioning and, where necessary, re-commissioning on behalf of the client.

2. Commissioning to be carried out in line with current Building Regulations and BSRIA[1] and CIBSE[2] guidelines, where applicable.

3. The main contractor accounts for the commissioning programme, responsibilities and criteria within the main programme of works.

4. A specialist commissioning manager is appointed (by either client or contractor) for complex systems such as:

    - Air conditioning
    - Mechanical ventilation, displacement ventilation, complex passive ventilation
    - Building management systems (BMS)
    - Renewable energy sources
    - Microbiological safety cabinets and fume cupboards
    - Cold storage enclosures and refrigeration plant

    The specialist commissioning manager must have been appointed during the design stage and the scope of their responsibility includes:

    - Design input: commissionability design reviews
    - Commissioning management input to construction programming
    - Commissioning management input during installation stages
    - Management of commissioning, performance testing and handover/post handover stages.

5. Where BMS specified, the following commissioning procedures must be carried out:

a. Commissioning of air and water systems is carried out when all control devices are installed, wired and functional
b. In addition to air and water flow results, commissioning results include physical measurements of room temperatures, off coil temperatures and other key parameters as appropriate
c. The BMS/controls installation should be running in auto with satisfactory internal conditions prior to handover
d. All BMS schematics and graphics (if BMS is present) are fully installed and functional to user interface before handover
e. The occupier will be fully trained in the operation of the system.

6. Where specified, all built-in cold storage and chilled rooms are commissioned in accordance with the criteria for refrigeration equipment as set out in the Carbon Trust publication GPG347 *Installation and commissioning of refrigeration systems*[3].

7. All cold storage and chilled rooms over 20m^2 meet the criteria of Section 9.1 of the Cold Store Code of Practice, Part 1[4].

8. Where specified, fume cupboards and microbiological safety cabinets are installed and commissioned in accordance with the following standards:

   a. Fume cupboards in accordance with BS EN 14175-2[5]and DD CEN/TS 14175-5[6]
   b. Microbiological safety cabinets in accordance with BS EN 12469 (2000)[7].
   c. The commissioning principles set by the HEEPI Labs21 programme *Commissioning* theme section[8].

Second credit

1. The first credit has been achieved.

2. The above appointment(s) include the following seasonal commissioning responsibilities over a minimum 12 month period, once the building becomes occupied:

   Complex Systems – Specialist commissioning manager
   a. Testing of all building services under full load conditions, i.e. heating equipment in mid-winter, cooling/ventilation equipment in mid-summer, and under part load conditions (spring/autumn)
   b. Where applicable, testing should also be carried out during periods of extreme (high or low) occupancy
   c. Interviews with building occupants (where they are affected by the complex services) to identify problems or concerns regarding the effectiveness of the systems
   d. Re-commissioning of systems (following any work needed to serve revised loads), and incorporating any revisions in operating procedures into the O&M manuals.

   Where specialist building services systems such as fume cupboards, microbiological safety cabinets and a cold storage system are present then the assessor must ensure that these systems are included in the specialist commissioning agent's responsibilities.

   Simple Systems (naturally ventilated) – External Consultant/Facilities Manager
   a. Review thermal comfort, ventilation, and lighting, at three, six and nine month intervals after initial occupation, either by measurement or occupant feedback.
   b. Take all reasonable steps to re-commission systems following the review and incorporate any relevant revisions in operating procedures into the O&M manuals.

Compliance Notes	
New Build	There are no additional or different criteria to those outlined above specific to new-build projects.
Refurbishment	There are no additional or different criteria to those outlined above specific to refurbishment projects.
Extensions to existing buildings	There are no additional or different criteria to those outlined above specific to the assessment of extensions to existing buildings.
Fit Out only	The criteria at this stage of assessment are the same as those identified at the design stage, subject to the following; 1. The criteria apply to the existing services, to encourage re-commissioning of those services following additional installation works, and to any new systems specified or integrated into the services strategy as part of the fit-out works. 2. Where the existing services have been commissioned or re-commissioned within the three years prior to the assessment, and therefore further commissioning or re-commissioning would be of little benefit, then this credit can be awarded by default. This is provided that the scope of the current fit-out works does not result in any of the following: a. Changing of layout which could enhance or reduce daylight, ventilation and zone controls such as partitioning, relocation of HVAC units etc; b. Changing perimeter services; c. Changes to zoned areas for HVAC equipment; d. Specification of additional or replacement plant/controls that affect HVAC or DHW systems.
Commissioning monitor (simple systems)	The commissioning monitor can be a person from within the contractor or sub-contractor organisation, provided they are not involved in the general installation works.
Specialist commissioning manager	The commissioning manager for complex systems must be a specialist contractor rather than a general sub-contractor.
Naturally ventilated buildings	Where the building is largely naturally ventilated, using simple cross-flow ventilation relying solely on openable windows and/or trickle vents (except in areas where mechanical ventilation is legally required), the appointment of a specialist commissioning agent is not required to award this credit. If a BMS system is employed, however, to control the natural ventilation and/or if renewable energy sources are utilised in the development, the requirement for a specialist commissioning agent remains.

Schedule of Evidence Required

Req.	Design Stage	Post Construction Stage
First Credit		
1&4	A copy of a letter or commissioning responsibilities schedule confirming the appointment of [or commitment to appoint]: • Design team member(s) as commissioning monitor and scope of their commissioning role. • Specialist commissioning manager and scope of their commissioning role.	Commissioning records/reports confirming: • Monitoring actions carried out by the nominated design team member. • Specialist commissioning manager's actions/role.
2	A copy of the specification clause stating: • The standards and codes of practice to which commissioning procedures are to comply with.	Commissioning records/reports confirming: • Commissioning procedures executed in compliance with relevant standards.
3	A copy of the specification clause confirming: • The managing contractor's responsibilities with respect to this requirement. **OR** A copy of a commissioning schedule highlighting: • Managing contractor's commissioning responsibilities.	A copy of the main contract programme highlighting; • Commissioning, performance testing and handover period.
5	A copy of the specification clause/commissioning schedule confirming: • The stages of the BMS/Controls commissioning procedures.	Commissioning records/reports confirming that; • BMS/controls commissioning activities were carried out in compliance with the commissioning schedule/specification clause.
6&7	A copy of the specification clause requiring: • The standards and codes of practice to which commissioning procedures are to comply with.	Commissioning records/reports confirming: • Commissioning procedures executed in compliance with relevant standards.
8	A copy of the specification clause stating: • The standards and codes of practice to which commissioning procedures are to comply with. • .	Commissioning records/reports confirming: • Commissioning procedures executed in compliance with relevant standards.
Second Credit		
1	Evidence (as outlined above) confirming compliance with the first credit.	Evidence (as outlined above) confirming compliance with the first credit.

2	As evidence criteria for 1 & 3 of the first credit. This evidence must confirm the scope of seasonal commissioning responsibilities/tasks (as required).	A copy of the seasonal commissioning schedule/programme. **OR** A copy of the letter of appointment of commissioning specialist and scope of their responsibilities.

Additional Information

Relevant definitions
None.

Issue ID	Issue Title	No. of credits available	Minimum standards
Man 2	Considerate Constructors	2	Yes

Aim

To recognise and encourage construction sites which are managed in an environmentally and socially considerate and accountable manner.

Assessment Criteria

The following demonstrates compliance:

1. The main contractor has complied with and achieved formal certification under the Considerate Constructors Scheme(CCS), credits awarded as follows: (see Checklist A1)

    a. One credit where the contractor achieved a CCS *Code of Considerate Practice* score between 24 and 31.5.
    b. Two credits where the contractor achieved a CCS *Code of Considerate Practice* score between 32 and 35.5.

OR

2. The main contractor has complied with an **alternative, independently assessed scheme** (equivalent to CCS), credits awarded as follows: (see Checklist A2)

    a. One credit where the site has been independently assessed using the alternative scheme, **AND** the alternative scheme addresses all the mandatory items plus 50% of the optional items in Checklist A2.
    b. Two credits where the site is to be independently assessed using the alternative scheme **AND** the alternative scheme addresses all the mandatory items plus 80% of the optional items in Checklist A2.

Exemplary level criteria
The following outlines the exemplary level criteria to achieve an *innovation credit* for this BREEAM issue:

1. The main contractor has complied with and achieved a certified CCS *Code of Considerate Practice* score of 36 or more.

OR

2. The main contractor has complied in full with the alternative, independently assessed scheme, and the alternative scheme addresses all the mandatory and optional items in Checklist A2.

Compliance Notes	
New Build	There are no additional or different criteria to those outlined above specific to new-build projects.
Refurbishment	There are no additional or different criteria to those outlined above specific to refurbishment projects.

Extensions to existing buildings	There are no additional or different criteria to those outlined above specific to the assessment of extensions to existing buildings.
Fit Out Only	The criteria at this stage of assessment are the same as those identified at the design stage.
Considerate Constructors score	No credits can be awarded for the Considerate Constructors Scheme where any of the section scores within the scheme are less than 3, as this represents non compliance with the CCS *Code of Considerate Practice*.
Site monitored by CCS more than once	Often a site will be visited by the CCS Monitor more than once. The CCS Certificate will be awarded based on the results of the Monitor's final visit. At the final stage of the BREEAM assessment the number of BREEAM credits awarded should therefore be based on the final visit and the subsequent Monitor's report and certified CCS score.
Contractor not yet appointed	At the interim design stage of assessment, where the contractor is not yet appointed, the client must either include within the specification, or commit to including, a requirement for the appointed contractor to comply with one of the above criteria. The assessor must use this information to complete the appropriate checklist.
Alternative scheme	Where the project is using an alternative scheme to the CCS, it is the alternative scheme and its assessment criteria that are assessed against Checklist A2, NOT the project or its contractor.
Site clearance	The scope of this issue applies to the main contractor and their scope of works. If the scope of the main contractor's works includes demolition and site clearance then this stage of work falls within the scope of the credit criteria.

Schedule of Evidence Required

Req.	Design Stage	Post Construction Stage
1	A copy of the relevant section of the main contract specification confirming: • A requirement to comply with the CCS • The minimum score to be achieved in each CCS section. **OR** A formal letter from the client/developer confirming: • The main contract will include a clause requiring CCS certification • The scope of the main contractor's works • A completed copy of checklist A1.	A copy of the Considerate Constructors Scheme certificate of compliance. The Considerate Constructors Monitors report highlighting the total score and the sub scores in each section.
2	A copy of the assessment criteria for the alternative scheme that allows the assessor to complete checklist A2. **AND** A formal letter from the client/developer confirming: • The main contract will include a clause requiring compliance with the alternative scheme	A copy of the compliance report (and any certification) for the alternative scheme.

	• The procedure, and individual/ organisation responsible for third party assessment of site compliance. • The scope of the main contractor's works	
Exemplary Credit		
1-2	A formal letter from the main contractor confirming their commitment to: • Gaining CCS or equivalent certification • A minimum score of ≥36 or equivalent.	Evidence as outlined above for req.1.

Additional Information

Relevant definitions

Considerate Constructors Scheme is a UK certification scheme that encourages the considerate management of construction sites. The scheme is operated by the Construction Confederation and points are awarded in increments of 0.5 over the following eight sections:

- Considerate
- Environmentally Aware
- Site Cleanliness
- Good Neighbour
- Respectful
- Safe
- Responsible
- Accountable

To achieve certification under this scheme a score of at least 24 is required.

www.considerateconstructorsscheme.org.uk

Alternative local or national schemes: Where the client/contractor has not used the Considerate Constructors Scheme (CCS) but has made a firm commitment to adopt an alternative independently assessed scheme covering the key issues in Checklist A2, the credits can still be achieved. The purpose of Checklist A2 is to enable the assessor to check whether an alternative, independently assessed scheme complies with the BREEAM assessment criteria. It is not in itself an equivalent construction site management scheme.

Issue ID	Issue Title	No. of credits available	Minimum standards
Man 3	Construction Site Impacts	4 (new builds/refurbs) 3 (Fit-out only)	No

Aim

To recognise and encourage construction sites managed in an environmentally sound manner in terms of resource use, energy consumption and pollution.

Assessment Criteria

The following demonstrates compliance:

1. One credit where evidence provided demonstrates that 2 or more of items a-g (listed below) are achieved. **OR**

   Two credits where evidence provided demonstrates that 4 or more of items a-g (listed below) are achieved. **OR**

   Three credits where evidence provided demonstrates that 6 or more of items a-g (listed below) achieved:

   a. Monitor, report and set targets for CO_2 or energy arising from site activities
   b. Monitor, report and set targets for CO_2 or energy arising from transport to and from site
   c. Monitor, report and set targets for water consumption arising from site activities
   d. Implement best practice policies in respect of air (dust) pollution arising from the site
   e. Implement best practice policies in respect of water (ground and surface) pollution occurring on the site
   f. Main contractor has an environmental materials policy, used for sourcing of construction materials to be utilised on site
   g. Main contractor operates an Environmental Management System.

   The Assessment Criteria for items a-g are detailed in the relevant section of Checklist A3.

2. One credit where evidence provided demonstrates that at least 80% of site timber is responsibly sourced and 100% is legally sourced.

Fit Out only assessments

1. One credit where evidence provided demonstrates that the fit-out contractor adopts best practice policies in respect of air (dust) pollution arising from the site.

2. One credit where evidence provided demonstrates that the fit-out contractor has an environmental materials policy, used for sourcing of construction materials to be utilised on site.

3. One credit where evidence provided demonstrates that the fit-out contractor operates an Environmental Management System.

The Assessment Criteria for each of the above items are detailed in the relevant section of Checklist A3.

Compliance Notes

New Build	There are no additional or different criteria to those outlined above specific to new-build projects.
Refurbishment	There are no additional or different criteria to those outlined above specific to refurbishment projects.
Extensions to existing buildings	There are no additional or different criteria to those outlined above specific to the assessment of extensions to existing buildings.
Fit Out Only	Follow the criteria outlined above for fit out only assessments.
Site timber	The fourth credit (for responsibly sourced site timber) is not dependent on any of the first three credits being achieved. For the purpose of assessing this issue, site timber is considered to be timber used to facilitate construction, including formwork, site hoardings and other temporary site timber used for the purpose of facilitating construction. It does not cover structural timber and timber used for fit-out items (this is addressed in BREEAM issue Mat 5).
Site clearance	The scope of this issue applies to the main contractor and their scope of works. If the scope of the main contractor's works includes demolition and site clearance then this stage of work falls within the scope of the assessment criteria.

Schedule of Evidence Required

Req.	Design Stage	Post Construction Stage
All	A copy of the relevant section from the main contract specification confirming: • Contractor's obligations in respect to each item on the checklist • Site timber will be sourced from suppliers capable of providing certification to the level required for the particular tier claimed (see Table 15 Responsible Sourcing Tier Levels and Criteria of BREEAM issue MAT 5) • All timber will come from a 'legal source' and is not on the CITES list*. **OR** Where the main contract specification is not yet available, a formal letter from the client/developer including: • Completed checklist A3 identifying which items will form part of the main contractor's obligations. • The policy for sourcing site timber for the project. • Confirmation that the above will be implemented in compliance with BREEAM's criteria. * Or in the case of Appendix III of the CITES list, it has not been sourced from the country seeking to protect this species as listed in Appendix III.	Site records demonstrating monitoring and recording of the following (where relevant): • Site energy/CO_2 consumption • Site deliveries • Site water consumption Project targets set for water and energy consumption. Copies of the documented procedures used on site for working to best practice pollution management guidelines. A letter from the main contractor confirming: • Procedures for pollution management and mitigation were implemented • Name/job title of individual responsible for monitoring and managing construction site impacts throughout the project. A copy of the certification document or Chain of Custody (CoC) certificate(s) for the site timber. Where any non-certified timber is used, written confirmation from the supplier(s) confirming that: • All timber comes from a legal source. • All timber species and sources used in the development are not listed on any of the CITES appendices for endangered or threatened species (Appendix I, II, or III*).

Additional Information

Relevant definitions

CITES (Convention on International Trade in Endangered Species)[9] Appendices I and II of the CITES list illustrate species of timber that are protected outright. Appendix III of the CITES list illustrates species that are protected in at least one country. If a timber species used in the development is on Appendix III it can be included as part of the assessment as long as the timber is not obtained from the country(s) seeking to protect this species.

Chain of Custody: This is a process used to maintain and document the chronological history of the evidence/path for products from forests to consumers. Wood must be tracked from the certified forest to the finished product. All the steps, from transporting wood from the forest to a sawmill, until it reaches the customer, must maintain adequate inventory control systems that allow for separation and identification of the certified product. Chain-of-custody certification ensures that a facility has procedures in place to track wood from certified forests and avoid confusing it with non certified wood. Chain-of-custody is established and audited according to relevant forest certification systems rules.

Pollution
BRE[10] publishes guidance on construction site dust management, and the Environment Agency[11] publishes guidance on water pollution control measures. There are significant statutory criteria in this area under environmental health legislation and the Environmental Protection Act. The Environment Agency and local Environmental Health Officers police these.

Energy
Energy Management on site has been a key focus for the Construction Confederation[12], and they have published specific guidance to help achieve this. Monitoring and reporting at site level are the key factors in raising awareness of the impacts of energy consumption. Whilst total energy is frequently monitored, this information is predominantly used to feedback into the tendering process and is seldom used to seek improvements on the site in question.

Targets
Targets are requested in the BREEAM criteria to promote the process of setting, monitoring and achieving targets. BREEAM does not set targets, as these are very project specific. For guidance on setting targets, refer to Constructing Excellence' Construction Industry KPI and Benchmarking (www.constructingexcellence.org.uk/zones/kpizone/default.jsp); this series of documents guides the reader through setting targets for their own projects.

Issue ID	Issue Title	No. of credits available	Minimum standards
Man 4	Building User Guide	Up to 2	Yes

Aim

To recognise and encourage the provision of guidance for the non technical building user so they can understand and operate the building efficiently.

Assessment Criteria

The following demonstrates compliance:

First credit (all educational building types)

1. A Building User Guide that contains the information described under the '*User Guide Contents*' heading (see additional guidance) has been developed.

2. The *guide* is relevant to the non-technical building user and appropriate to the stakeholder(s) that will occupy the building.

Second credit (Higher educational laboratory building type or function only)

1. A Laboratory User Guide that contains the information described under the '*User Guide Contents*' heading (see additional guidance) has been developed.

2. The guidance is relevant to the laboratory users that will occupy and use the facilities.

Compliance Notes	
New Build	There are no additional or different criteria to those outlined above specific to new-build projects.
Refurbishment	There are no additional or different criteria to those outlined above specific to refurbishment projects.
Extensions to existing buildings	There are no additional or different criteria to those outlined above specific to the assessment of extensions to existing buildings.
Fit Out Only	The criteria at this stage of assessment are the same as those identified at the design stage. Where there is an existing Building User Guide this must be updated in line with the scope of the fit-out work that will be undertaken and comply with the BREEAM criteria. The guide must be developed/updated by, or in collaboration with, the fit-out project team/contractor. Where there is not an existing Building User Guide this must be prepared to cover all aspects of the building, including aspects included in the shell construction/systems (if relevant).
Operation and Maintenance manual	The presence of a building O&M manual does not meet this requirement. The latter provides the detailed specialist information required by technical Facilities Managers (FMs) and maintenance staff/contractors. The guide can be contained in the Operation & Maintenance (O&M) manual, but must be an extractable or 'stand alone' section.

Buildings without laboratories	If the building does not have laboratory space or is not a laboratory building then the second credit does not need to be assessed. The assessor's spreadsheet tool will filter this credit from the assessment.

Schedule of Evidence Required

Req.	Design Stage	Post Construction Stage
1&2	A copy of the specification clause confirming: • Requirement to develop a Building User Guide • Scope of the Guide's contents. **OR** A formal letter from the client/developer confirming: • That the design team will be required to develop a Building User Guide. • The contents of the Guide will be developed in compliance with the BREEAM criteria.	A copy of the Building User Guide. Written confirmation from the design team that the guide has been distributed to the building's owner, tenant(s) or fit out contractor (for completion), as appropriate.

Additional Information

User Guide Contents
The list below indicates the type of information that should be included to meet the needs of the Facilities Management (FM) Team/Building Manager and the general users (staff and if applicable to scheme/building, residents).

1. **Building Services Information**
   a. General Users/Residents - Information on heating, cooling and ventilation in the building and how these can be adjusted, e.g. thermostat location and use, implications of covering heating outlets with files, bags etc., and use of lifts and security systems.
   b. FM – As above, plus a non-technical summary of the operation and maintenance of the building systems (including BMS if installed) and an overview of controls.

2. **Emergency Information**
   a. General Users/Residents - Include information on the location of fire exits, muster points, alarm systems and fire fighting systems.
   b. FM - As above, plus details of location and nature of emergency and firefighting systems, nearest emergency services, location of first aid equipment.

3. **Energy & Environmental Strategy**
   This should give owners and occupiers information on energy-efficient features and strategies relating to the building, and also provide an overview of the reasons for their use, e.g. economic and environmental savings. Information could include:
   a. General Users/Residents – Information on the operation of innovative features such as automatic blinds, lighting systems etc., and guidance on the impacts of strategies covering window opening and the use of blinds, lighting and heating controls
   b. FM - As above, plus information on airtightness and solar gain (e.g. the impact of leaving windows/doors open in an air conditioned office, or use of blinds in winter with respect to solar gain); energy targets and benchmarks for the building type, information on monitoring such as the metering and sub-metering strategy, and how to read, record and present meter readings.

4. Water Use

a. General Users/Residents – details of water saving features and their use and benefits, e.g. aerating taps, low flush toilets, leak detection, metering etc.
b. FM – As above, plus details of main components (including controls) and operation. Recommendations for system maintenance and its importance, e.g. risk of legionella.

5. Transport Facilities

a. General Users/Residents – details of car-parking and cycling provision; local public transport information, maps and timetables; information on alternative methods of transport to the workplace, e.g. car sharing schemes; local 'green' transport facilities.
b. FM - As above, plus information on conditions of access, maintenance and appropriate use of car parking and cycling facilities, e.g. number of spaces provided.

Higher Education Institutes only

The above information in point 5 does not need to be included in the user's guide if there is a separate dedicated travel information space, accessible to the staff, and in compliance with BREEAM issue Tra 7. However, the guide must reference the travel information space, the information provided and its location.

6. Materials & Waste Policy

a. General User – Information on the location of recyclable materials storage areas and how to use them appropriately.
b. FM – As above, plus information on recycling, including recyclable building/office/fit out components, waste storage and disposal criteria; examples of Waste Management Strategies and any cleaning/maintenance criteria for particular materials and finishes.

7. Re-fit/Re-arrangement Considerations

a. General Users/Residents – an explanation of the impact of re-positioning of furniture, i.e. may cover grilles/outlets, implications of layout change, e.g. installation of screens, higher density occupation etc.
b. FM - As above, plus environmental recommendations for consideration in any refit. Relevant issues covered in BREEAM should be highlighted, e.g. the use of natural ventilation, use of Green Guide 'A' rated materials, reuse of other materials etc., the potential impact of increasing occupancy and any provision made in the original design to accommodate future changes.

8. Reporting Provision

a. General Users/Residents – Contact details of FM/manager, maintenance team, and/or help desk facility; and details of any building user group if relevant.
b. FM – As above, plus contact details of suppliers/installers of equipment and services and their areas of responsibility for reporting any subsequent problems.

9. Training

Details of the proposed content and suggested suppliers of any training and/or demonstrations in the use of the building's services, features and facilities that will be needed. This could include:

a. General Users/Residents - Training in the use of any innovative/energy saving features.
b. FM – As above, plus training in emergency procedures and setting up, adjusting, and fine tuning, the systems in the building.

10. Links & References

This should include links to other information including websites, publications and organisations. In particular, the Carbon Trust programme should be referenced and links provided to its website and good practice guidance.

11. General

Where further technical detail may be required by the FM Team or manager there should be references to the appropriate sections in the Operation and Maintenance Manual.

Laboratory specific building user guide contents (where applicable)

Energy and Health and Safety staff should be involved in the development of this guide to ensure relevant results.

1. **Training:**
   Include details of proposed content of any training and/or demonstrations in the use of the laboratory facilities and equipment as needed.
   a. General user - this could include COSHH and Home Office Regulations (where relevant), training in the use of any innovative/energy saving features and specialist equipment, emergency procedures;
   b. FM - as above plus training in setting up, adjusting, and fine tuning the systems in the laboratory areas.

2. **Safety and Emergency procedures:**
   This should include:
   a. Safe handling of hazardous materials and substances;
   b. Security procedures for the laboratory operation;
   c. Any procedure for evacuation, disinfection, decontamination as appropriate in case of emergency;
   a. Emergency telephone numbers.

3. **Energy and environmental strategy:**
   This section should give users information on energy-efficient features and strategies related to the laboratory, and also provide an overview of the reasons for their use, e.g. economic and environmental savings. Information could include:
   a. Information on the energy efficient operation of fume cupboards and microbiological safety cabinets (where present), including considerations on the impact of overloading fume cupboards and leaving fume cupboards' sashes open when not needed.
   b. Good housekeeping and management planning to ensure that any equipment operation is minimised, that time clock functions are utilised and that equipment is not left on unnecessarily.
   c. Checking that the equipment has been tested and/or inspected via equipment log.
   d. Minimisation of use of artificial lighting and temperature controls, and switching off of equipment, lights, PCs etc.
   e. Minimisation of use of water.

4. **Materials and Waste**
   This should include:
   a. List of potential hazardous materials and waste and risks associated (COSHH);
   b. Safe waste segregation and disposal instructions;
   c. Potential for reuse/recycling any non-hazardous waste.

5. **Checklist of safety and best practice daily procedures** to be completed prior to leaving the laboratory area

6. **Links, references and useful contact numbers**

Building Log Book
The Building Regulations Part L requires the provision of a 'Building Log-Book' to the owner and/or occupier of the building. In addition on completion, the Construction Design and Management Regulations require the Health and Safety file to be passed onto the building user.

BREEAM requires an additional 'Building User Guide' that contains the necessary details about the everyday operation of the development in a form that is easy for the intended users to understand.

Without the provision of adequate information and guidance it is likely that the building will be used inappropriately leading to the dissatisfaction of occupants and wasted resources. For example: Some ventilation and/or lighting systems can be impaired by inappropriate positioning of partitions, office furniture etc. so causing inefficiencies, a lack of comfort and poor performance.

The aim of this issue is to ensure that design features are used efficiently and that changes to office space are managed in the most appropriate manner. For example, the design team of a speculative, open plan office, are likely to have considered the need for meeting or cellular space, and may have provided additional riser or duct space to assist future use. The design of the building may require additional or expanded systems to be installed if occupant levels rise above those designed for. This information should be passed on to the personnel making management decisions, so that they are aware of the implications of such decisions on the management of the building.

Issue ID	Issue Title	No. of credits available	Minimum standards
Man 5	Site Investigation	1	No

Aim

To recognise and encourage detailed site investigation to ensure the building accounts for site conditions and any remedial action required is taken.

Assessment Criteria

The following demonstrates compliance:

1. The site has been investigated to determine local conditions that will affect the design and specification of the proposed development.

2. The following areas are covered in the investigation:

    a. Ground and ground water conditions assessed in accordance with BS5930 Code of Practice for Site Investigations[13]
    b. Establishing the engineering properties of the soil and aggressiveness of the ground water in accordance with BS1377:1990 - Parts 1-9 *Methods of test for soils for civil engineering purposes*[14]
    c. If the site investigation indicates the site may be contaminated, further investigations are carried out in accordance with BS 10175:2001 *Investigation of potentially contaminated sites*[15].

3. The *relevant bodies* (see Compliance Notes) have been consulted and confirm the absence of the following:

    a. Buildings of local architectural or historical interest referred to in a local authority development plan
    b. Buildings within areas of outstanding natural beauty and national parks
    c. Scheduled ancient monuments buildings in historic parks and gardens
    d. Buildings within the curtilage of scheduled ancient monuments
    e. Buildings or sites with distinguishing local architectural characteristics
    f. Sites of archaeological interest

4. Where the building/site is identified as one of the above types appropriate measures have been taken to protect any areas/features of value and all relevant bodies have been consulted and have agreed the design adopted.

5. The site investigation has been carried out at, or prior to, RIBA Stage C *concept design*, or equivalent.

Compliance Notes	
New Build	There are no additional or different criteria to those outlined above specific to new-build projects.

Refurbishment	For refurbishment projects that do not include ground works or additional structural load, the ground investigation detailed in requirement 2 is not required. All other credit criteria remain applicable. For refurbishment projects that do include ground works or additional structural load, advice should be sought from BRE on whether requirement 2 is applicable.
Extensions to existing buildings	There are no additional or different criteria to those outlined above specific to the assessment of extensions to existing buildings.
Relevant Bodies	The relevant bodies, depending on the UK region, will typically include: the Local Authority, English Heritage, Historic Scotland, Natural England, Scottish Natural Heritage, Environment and Heritage Service (NI) or appropriate agency department of the Assembly Government (Wales).

Schedule of Evidence Required

Req.	Design Stage	Post Construction Stage
1,2&5	A copy of the site investigation report.	The evidence required at this stage of assessment is the same as that identified at the design stage. **AND** Formal written confirmation from the design team that measures identified at the design stage to protect features/buildings were implemented.
3	A copy of correspondence with/from the *Relevant Body.*	
4	A marked-up site plan identifying: • Proposed development • Sensitive buildings/sites in proximity • Location and scope of protection measures.	

Additional Information

Relevant definitions
None.

Issue ID	Issue Title	No. of credits available	Minimum standards
Man 6	Consultation	2	No

Aim

To involve the relevant stakeholders (including building users, business, residents and local government) in the design process in order to provide buildings fit for purpose and to increase local "ownership".

Assessment Criteria

The following demonstrates compliance:

First credit

1. During the preparation of the brief (equivalent to stage B) the following was undertaken:

    a. Members of the local community and *appropriate stakeholders* identified with whom the design team consulted
    b. Knowledge and experience collated from the existing buildings of the same type (if relevant) to identify existing partnerships and networks. If the building is a new development in an existing community or for a community still under construction, a representative consultation group should be identified from similar buildings of the same type in the same authority/area
    c. A consultation plan was prepared and included a timescale and methods of consultation, clearly identifying at which points consultees can usefully contribute and how they will be kept informed about progress on the project.

2. The consultation included at least the following issues:

    a. Functionality, building quality and local impact (including aesthetics)
    b. Building user satisfaction/productivity
    c. Management and operational implications
    d. Maintenance resources/burdens
    e. Good and bad examples of buildings of the same type.
    f. Local traffic/transport impact.
    g. Opportunities for shared use of facilities and infrastructure with the community/*appropriate stakeholders*

3. Feedback has been given to the consultation group regarding suggestions made, and this feedback covered:

    a. What was proposed during the consultation exercise
    b. How each of these proposals were considered
    c. The outcome, e.g. implementation of suggestions or description of why options have not been deemed feasible.

Where **higher educational laboratory building** type or function is present:

4. A stakeholder engagement workshop has been undertaken at RIBA stage B or equivalent with the scope of determining the client's broad requirements with concern to laboratory facilities. The workshop must have been attended by the following (as a minimum):

    a. Internal staff (including senior representatives from estates, academic users, and laboratory managers/technicians)
    b. Design team, including the mechanical engineer
    c. Project manager.

5. A design team meeting has been undertaken at RIBA stage C or equivalent with a focus on appropriate sizing, optimisation and integration of laboratory equipment and systems. As a result, the design has been developed by using a risk assessment approach and, where possible, it was supported by the use of 3D modelling for pipework and duct planning. The workshop must have been attended by the following (as a minimum):

    a. Internal staff (including a representative from the maintenance function)
    b. Design team, including representatives from the architects and all significant building services contractors
    c. Project manager.

6. The results of the above activities have been summarised in a design intent document, which has been approved by all parties involved and formed the basis of subsequent quality control.

Second credit

1. The first credit is achieved.

2. The consultation process used an independent method carried out by a third party, such as DQI, DQM or School Works (see Additional Information section).

Compliance Notes	
New Build	There are no additional or different criteria to those outlined above specific to new-build projects.
Refurbishment	There are no additional or different criteria to those outlined above specific to refurbishment projects.
Extensions to existing buildings	There are no additional or different criteria to those outlined above specific to the assessment of extensions to existing buildings.
Fit Out Only	Issue not applicable to fit-out-only assessments.
Relevant Bodies	The relevant bodies, depending on the UK region, will typically include: the Local Authority, English Heritage, Historic Scotland, Environment and Heritage Service (NI) or appropriate agency department of the Assembly Government (Wales).
Appropriate stakeholders – Pre-school, Schools & sixth form colleges	Includes the following (as appropriate to the school building type): • Local residents and volunteer group(s) • Ex pupils/students group(s) • Teachers/lecturers (representative groups) • Local businesses • Design team members and main contractor • Community groups (for example based on religion, leisure or culture) • Local Authority and/or local education service providers.

Appropriate stakeholders – Further and Higher Education buildings	Where the assessment concerns a new building or a refurbishment within an existing campus i.e. an infill development, it is sufficient to consult with relevant stakeholders, including the following (as appropriate): • Students and staff groups and unions • Alumni associations • Director of estate • Researchers • Teachers/lecturers (representative groups) • Departmental and institutional senior management • Design team members and main contractor • Local Authority and/or local education service providers • Health and Safety representative Where the assessment concerns a whole campus, members of the local community must also be identified and consulted with. These would typically include: • Local residents and volunteer groups • Local businesses • Community groups (for example based on religion, leisure or culture)

Schedule of Evidence Required

Req.	Design Stage	Post Construction Stage
First Credit		
1	A list of the stakeholders consulted.	Evidence as outlined at the design stage of assessment.
2	A consultation plan setting out the process and the scope of the consultation. Copies of agendas and minutes of meetings with the stakeholders demonstrating: • The consultation plan in action • The stage in plan of works that consultation occurred.	
3, 4 & 5	Copies of documentation demonstrating consultation feedback, including (where relevant): • Newsletters, posters, circulars etc. • Agenda and minutes from meetings.	
6	A copy of the design intent document.	
Second Credit		
1	Evidence (as outlined above) confirming compliance with the first credit.	Copies of the assessment results from the *Ready for Occupation* version of the DQI tool.
2	Name of the Construction Industry Council (CIC) approved registered DQI facilitator or School Works/DQM facilitator. Copies of the assessment results from the DQI tool for each stage of the project where DQI used.	

Second Credit		
1	As above.	As above.
2	Marked-up design plans and/or copy of the relevant sections of the specification documents illustrating: • The influence of the consultation process on the final design • Measures taken to protect features of historic value.	Assessor's building/site inspection and photographic evidence confirming: • Existence/installation of identified features on marked-up design plan or in specification.

Additional Information

Relevant definitions

Functionality: The way in which the building is designed to be useful and is split into use, access and space.

Build quality: The engineering and construction performance of a building.

Impact: The building's ability to create a sense of place, and have a positive effect on the local community and environment. This includes character and innovation, form and materials, internal environment and urban and social integration.

Consultation guidance and methodologies

There is a great deal of guidance available on community consultation, and many specialist organisations offer such services. Much of it is focussed on community planning, but is adaptable. Examples of guidance and methodologies in the public domain are:

- The National Charrette Institute is a non-profit educational institution that help communities achieve healthy transformation through collaborative planning processes that harnesses the talents and energies of all interested parties to create and support a buildable plan. www.charretteinstitute.org
- Planning for Real is a participative planning initiative. www.nifonline.org.uk
- For a guide to neighbourhood renewal and various resources see: www.renewal.net
- The Design Quality Indicator is a method to assess the design quality of buildings. www.dqi.org.uk
- The Commission for Architecture and the Built Environment has various publications to provide guidance on design, and a section on education on design for young people. www.cabe.org.uk
- School Works is a schools design initiative which has developed a participatory process, it forms a part of the British Council for School Environments (BCSE) www.bcse.uk.net
- Developed by BRE in 2002, the Design Quality Method (DQM)[16] is used by UK auditing authorities (Audit Commission; NAO; NIAO: and Audit Scotland) to assess the design quality and value-for-money of educational and health buildings.
- Learning through Landscapes can help with the design of spaces around schools. www.ltl.org.uk

Issue ID	Issue Title	No. of credits available	Minimum standards
Man 7	Shared facilities	2	No

Aim

To recognise and encourage flexible buildings designed to cater for shared use with the local community.

Assessment Criteria

The following demonstrates compliance:

Primary and secondary schools, sixth form and further education colleges and higher education

First credit

1. At least one credit has been achieved under Man 6 Consultation.

2. The design team confirms that:

    a. Potential users of the shared facilities (such as operators of clubs and community groups) have been consulted and their criteria have informed the brief.
    b. They met formally to consider feedback according to the consultation plan
    c. A document was produced describing the facilities to be shared and how access to them will be arranged
    d. This document has been communicated to all consultees.

Second credit

1. The first credit is achieved.

2. Shared facilities are provided in a separate and secured zone that can be accessed by members of the public/community without gaining uncontrolled access to other parts of the building.

3. Instructions and guidance on access and use of shared facilities has been developed and handed over to the building occupants (this can be included in the building user guide where such a guide is provided).

Compliance Notes	
New Build	There are no additional or different criteria to those outlined above specific to new-build projects.
Refurbishment	There are no additional or different criteria to those outlined above specific to refurbishment projects.
Fit Out	This issue is not applicable to a fit out only assessment.
Extensions to existing buildings	There are no additional or different criteria to those outlined above specific to the assessment of extensions to existing buildings.

Existing shared facilities	Where existing shared facilities are present on site that comply with the above Assessment Criteria (including the involvement of users and community in the consultation stage), the credits can be awarded. These facilities could be within an existing building, that does not form part of the assessment, provided the building is accessible to all relevant stakeholders.
Type of shared facilities	No criteria have been set in this respect as the types of space will vary according to the building size, type, and use and consultation feedback. Typical facilities may however include: • Sports facilities • Meeting and conference rooms • Drama and theatre space
Pre-schools	This issue does not apply to the assessment of pre-school developments i.e. nursery school and children centres.

Schedule of Evidence Required

Req.	Design Stage	Post Construction Stage
First Credit		
1	As outlined under issue Man 6 Consultation.	As outlined under issue Man 6 Consultation.
2	Agenda & minutes from design team meeting. A copy of the document, and its distribution list, outlining the strategy for shared facilities.	There is no additional evidence required at the post construction stage of assessment.
Second Credit		
2	A marked-up design plan highlighting: • The facilities that will be shared • Access and security zones for and around the shared facilities.	Assessor's building/site inspection and photographic evidence confirming: • Existence of shared facilities. • Access and security arrangements for the facilities.
3	A copy of the document containing the instructions and guidance on access and use of shared facilities. **OR** A formal letter from the design team confirming that such a document will be written and handed over to the building occupants.	A copy of the document containing the instructions and guidance on access and use of shared facilities.

Additional Information

Relevant Definitions:
None.

Issue ID	Issue Title	No. of credits available	Minimum standards
Man 8	Security	1	No

Aim

To recognise and encourage the implementation of effective design measures that will reduce the opportunity for and fear of crime on the new development.

Assessment Criteria

The following demonstrates compliance:

1. The design team has consulted with and sought the advice of the local police *Architectural Liaison Officer* (ALO) or *Crime Prevention Design Advisor* (CPDA) on designing out the opportunity for crime, in accordance with the principles and guidance of *Secured by Design*[17].

2. Consultation with the ALO/CPDA occurred during or prior to the *concept design* stage (RIBA stage C) or equivalent.

3. The final design embodies the recommendations of the ALO/CPDA and is built to conform to the principles and guidance of *Secured by Design*.

Compliance Notes	
New Build	There are no additional or different criteria to those outlined above specific to new-build projects.
Refurbishment	There are no additional or different criteria to those outlined above specific to refurbishment projects.
Extensions to existing buildings	There are no additional or different criteria to those outlined above specific to the assessment of extensions to existing buildings.
Fit Out Only	This issue is not assessed for a fit-out only assessment.
SBD Award	An actual Secured by Design Award/certificate is not required, though this does provide a means of demonstrating compliance at the post construction stage of assessment.
Schools	In addition to the SBD Schools guidance, Managing School Facilities, Guide 4 - *Improving Security in Schools*[18] offers guidance on how to improve the security of school premises.

Schedule of Evidence Required

Req.	Design Stage	Post Construction Stage
1&2	Correspondence from or a copy of the report/feedback from the ALO/CPDA confirming: • Scope of their advice/involvement • The stage of design in which their advice was sought • Summary of their recommendations	No additional evidence required to that outlined for the design stage of assessment.
3	A marked-up copy of the site/design plan(s) highlighting examples of: • The development conforming to ALO/CPDA recommendations and SBD principles and guidance. **OR** If the timing of assessment does not permit the above, a copy of the specification clause confirming: The development will conform to ALO/CPDA recommendations and SBD principles and guidance.	Assessor's building/site inspection and photographic evidence providing examples of: • The site/development conforming to key ALO/CPDA recommendations. **OR** Correspondence from the ALO/CPDA confirming: • The as-built development or design complies with their recommendations. **OR** A copy of the development's '*Secured by Design*' certificate.

Additional Information

Relevant definitions:

Secured by Design (SBD): A police initiative that seeks to encourage the construction industry to adopt crime prevention measures in the design of developments, to assist in reducing the opportunity for and fear of crime.

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.

The Association of Chief Police Officers for England Wales and Northern Ireland (ACPO) and the Association of Chief Police Officers for Scotland (ACPOS) represent the police forces of the United Kingdom and both organisations endorse and support the Secured by Design programme.

Issue ID	Issue Title	No. of credits available	Minimum standards
Man 9	Publication of building information	1	Yes

Aim

To recognise and encourage the publication of information related to the aspects of the design and procurement process' which reduce the overall environmental impact of the building.

Assessment Criteria

The following demonstrates compliance:

1. The information listed below is publicised as a case study through one of the following means:

    a. Developer's own website, publicly available literature or press release
    b. Industry/sector or Government/Local Authority sponsored website or information portals.
    c. Relevant public sector, organisation or institutional website or literature.

2. The following project related information is publicised in the case study:

- A basic description of the project and building
- BREEAM Rating and score
- The key innovative and low-impact design features of the building
- Basic Building Cost - £/m^2
- Services Costs - £/m^2
- External Works - £/m^2
- Gross floor area - m^2
- Total area of site – hectares
- Function areas and their size (m^2)
- Area of circulation (m^2)
- Area of storage (m^2)
- % area of grounds to be used by community (where relevant)
- % area of buildings to be used by community (where relevant)
- Predicted electricity consumption - kWh/m^2
- Predicted fossil fuel consumption - kWh/m^2
- Predicted renewable energy generation - kWh/m^2
- Predicted water use - m^3/person/year
- % predicted water use to be provided by rainwater or greywater
- The steps taken during the construction process to reduce environmental impacts, i.e. innovative construction management techniques
- A list of any social or economically sustainable measures achieved/piloted.

3. At least two of the following must be met:

- The first credit of Man 6 *Consultation* has been achieved
- Site visits have been arranged for future building users
- Building users and/or other stakeholders have been given the opportunity to attend design team meetings
- Building users and/or other stakeholders are given regular presentations on progress of design/construction
- Online and updated information on the progress of the design and construction of the project.

Compliance Notes

New Build	There are no additional or different criteria to those outlined above specific to new-build projects.
Refurbishment	There are no additional or different criteria to those outlined above specific to refurbishment projects.
Extensions to existing buildings	There are no additional or different criteria to those outlined above specific to the assessment of extensions to existing buildings.
Buildings for which this credit is not applicable	Higher Educational buildings of a sensitive or secure nature or where confidential and sensitive information are handled or for which confidentiality agreements have been signed may be exempt from the assessment of this issue. In this case, the assessor must provide a statement in their report justifying why this assessment issue is exempt.
Shell Only	There are no additional or different criteria to those outlined above specific to the assessment of shell-only buildings.
Fit Out Only	Issue not applicable to Fit-out only assessments.

Schedule of Evidence Required

Req.	Design Stage	Post Construction Stage
1&2	A formal letter from the developer or design team confirming: • A case study for the development will be prepared. • The information to be included in the case study. • The medium for case study publication.	A copy of the published case study.
3	As appropriate: • Evidence as required for issue M6. • A marked-up programme showing dates of site visits. • A marked-up programme showing dates of design team meetings attended by building users/stakeholders. • The programme for presentations that have been or will be given. • A brief description of the subject of each presentation or copy of the presentation. • The web address for publicly accessing information on the design and construction process.	As appropriate: • Evidence as required for issue M6. • A formal letter from the design team or main contractor confirming date(s) of site visits and design team meetings attended by building users/stakeholders. • A copy of the presentation. • Assessor check of website to ensure project information is valid and up to date.

Additional Information

Relevant definitions
None

Issue ID	Issue Title	No. of credits available	Minimum standards
Man 10	Development as a learning resource	1	Yes

Aim

To recognise and encourage the use of the building and site as a learning resource for demonstrating environmental awareness.

Assessment Criteria

The following demonstrates compliance:

1. At least one credit has been achieved under Man 6 Consultation.

2. For **pre-schools, schools** and **sixth from colleges** the building **and** landscape, or for **further and higher education colleges** the building **and/or** landscape is (based on the consultation process):

    a. Designed, or includes features or installations that demonstrate to future building users a local and/or global environmental impact of building development or operation, and how the building and/or landscape mitigates such impacts.

2. Due to the subjective nature of the issue and circumstances of the individual project strict Assessment Criteria have not been set. The items outlined below are suggestions that can be used to determine whether the building and/or landscape meet the BREEAM criteria.

Building

1. Use of demonstration projects such as:

    a. A working renewable energy source such as PV's or wind turbines with a description of the technology and live data on energy generated and subsequent CO_2 emissions prevented.
    b. Alternative heating sources such as wood fuel, solar thermal, geothermal with a description of the technology, live data on energy generated and subsequent CO_2 emissions prevented.
    c. Rainwater collection systems with live readings, a basic description of how the technology works and its environmental benefit.

2. Utilisation of the building fabric or structure; for example a cutaway wall section that shows building insulation use within the fabric, with internal and external temperature readings to demonstrate its function. Alternatively, innovative use of a low-impact building material(s) or technology, such as building products made from recycled materials, e.g. roof tiles made from recycled tyres.

3. A permanent display section with:

    a. Information on the building's design, construction and strategies to reduce its environmental impact
    b. General information on the environmental impact of the building as whole
    c. Low-impact building solutions and materials that can be specified in modern design and construction to mitigate such impacts.

4. Where energy or water meters with a pulsed output have been provided, the data can be displayed with a description of the system being monitored.

5. The demonstration/information for the building is presented in a part of the building that has regular user access: for example assembly halls, group or resource spaces.

Landscaping

6. The landscaping/site demonstrates either of the following:

    a. Space within or adjacent to the site boundary or in the local area/region has been set aside, to allow creation and management of a natural habitat or wetland
    OR
    b. Space within or adjacent to the site boundary or in the local area/region has been set aside to allow creation and management of an area for organic planting and/or animal husbandry.
    c. The landscaping/site space(s) are clearly marked and designated on a site plan and provide an adequately sized area for achievement of the aim.

Compliance Notes	
New Build	There are no additional or different criteria to those outlined above specific to new-build projects.
Refurbishment	There are no additional or different criteria to those outlined above specific to refurbishment projects.
Extensions to existing buildings	There are no additional or different criteria to those outlined above specific to the assessment of extensions to existing buildings.
Shell Only	There are no additional or different criteria to those outlined above specific to the assessment of shell-only buildings.
Fit Out Only	Issue not applicable for Fit-out-only assessments.
Buildings for which this credit is not applicable	Higher educational buildings of a sensitive or secure nature or where confidential and sensitive information are handled or for which confidentiality agreements have been signed may be exempt from the assessment of this issue. In this case, the assessor must provide a statement in their report justifying why this assessment issue is exempt. Higher educational buildings where no visitors or students are admitted (e.g. research only buildings) may be exempt from the assessment of this issue. In this case, the assessor must provide a statement in their report justifying why this assessment issue is exempt.
Site selection for schools	Building Bulletin 71[19] (section 4) outlines information on site selection and appraisal issues to consider when designating such a space.

Schedule of Evidence Required

Req.	Design Stage	Post Construction Stage
1	Evidence as outlined under issue Man 6 Consultation.	As outlined under issue Man 6 Consultation.
2	Marked-up design plan demonstrating: • The proposed/specified demonstration feature/installation.	Assessor's building/site inspection and photographic evidence confirming: • Installation and existence of the demonstration feature

Additional Information

Relevant definitions
None.

Issue ID	Issue Title	No. of credits available	Minimum standards
Man 11	Ease of maintenance	1	No

Aim

To recognise and encourage the specification of a building and building services that can be easily maintained during their lifecycle.

Assessment Criteria

The following demonstrates compliance:

1. The items identified for each of the key procurement stages in the checklist '*design guide to maintainable buildings*', outlined in Appendix 2 A1 of CIBSE *guide to ownership, operation and maintenance of building services*[20], have been addressed.

2. A critical appraisal has been completed at the feasibility stage of building procurement, covering the maintenance implications for different design options. This appraisal must comply with the following:

    a. Service life planning in accordance with ISO 15686 *Buildings and constructed assets* - Service life planning Part 1[21]

3. A maintenance strategy has been developed from the critical appraisal and formulated at the design stage. The maintenance strategy must cover the extent to which maintenance can be designed out and how support systems can be built into the specification to facilitate efficient and cost-effective operation and maintenance.

    The strategy must include an indication on how all major plant and equipment is to be removed and replaced within the design life of the building, including the access openings, lifting arrangement and route to and from the plant room at a delivery point.

4. Where there is a management plan for the landscaping (for example, as defined in BREEAM issue LUE 6 Long term impact on biodiversity), this has been included in the maintenance strategy.

5. Storage space has been provided for cleaning and general maintenance equipment in line with Building Bulletin's 98[22] / 99[23], as appropriate. This must be evenly distributed throughout the site/building and as a minimum, storage space is provided on each floor of the building.

Compliance Notes	
New Build	There are no additional or different criteria to those outlined above specific to new-build projects.
Refurbishment	There are no additional or different criteria to those outlined above specific to refurbishment projects.
Fit Out only	This issue is not assessed in a fit-out only assessment.
Extensions to existing buildings	There are no additional or different criteria to those outlined above specific to the assessment of extensions to existing buildings.

Schedule of Evidence Required

Req.	Design Stage	Post Construction Stage
1	A formal letter from the design team with: • Confirmation of use and compliance with the CIBSE checklist at the feasibility, outline proposal, system design and detailed design stages • A signed, dated and completed copy of the checklist for the relevant stages. • Indicative examples of how items on the checklist were addressed at each stage of design for the building.	A formal letter from the design team or main contractor with: • Confirmation of use and compliance with the CIBSE checklist at the Production information, tender, pre-construction, construction and commissioning stages. • A signed, dated and completed copy of the checklist for the relevant stages. • Indicative examples of how items on the checklist were addressed at each stage for the building.
2	A copy of the feasibility stage appraisal for the design options. A formal letter from the design team confirming: • Compliance of the appraisal with the relevant standard(s).	No additional evidence required to that outlined for the design stage of assessment.
3&4	A copy of the maintenance strategy (including the landscaping plan if appropriate). OR A formal letter from the design team confirming that: • A compliant maintenance strategy will be developed. • This will include the landscape maintenance plan, if relevant.	A copy of the maintenance strategy (including the landscaping plan if appropriate).
5	Marked-up drawings showing locations and sizes of the storage space.	Assessor's building/site inspection and photographic evidence confirming: • The location and sizes of the cleaners' storage space.

Additional Information

Relevant definitions
None.

Issue ID	Issue Title	No. of credits available	Minimum standards
Man 12	Life cycle costing	2	No

Aim

To recognise and encourage the development of a Life Cycle Cost (LCC) analysis model for the project to improve design, specification and through-life maintenance and operation.

Assessment Criteria

The following demonstrates compliance:

First credit

1. A Life Cycle Cost (LCC) analysis has been carried out based on the proposals developed during RIBA Work Stages C/D (concept design/design development), or equivalent.

2. The Life Cycle Costs analysis, based on the concept design/design development proposals, covers the following stages:

    a. Construction
    b. Operation - includes, as a minimum, utilities
    c. Maintenance - includes, as a minimum, planned maintenance, replacements and repairs, cleaning, management costs
    d. End of life.

3. The LCC analysis uses a study period of 25 or 30 (as applicable) **AND** 60 years, shown in *real* and *discounted* cash flow terms.

4. The analysis demonstrates that at least two of the following issues have been analysed at a strategic and system level (as per figure 6, Different levels of analysis at different stages of the life cycle, ISO 15686-5[21]), comparing alternative options:

    a. Structure
    b. Envelope
    c. Services
    d. Finishes

    The chosen solution is the one that best meets the performance criteria for the built asset.

5. The option(s) with the lowest discounted LCC over the period is preferred, assuming that their selection results in at least one of the following:

    a. The lowest building energy consumption over the operational life span of the building (compared to other options/alternatives analysed)
    b. A reduction in maintenance requirement/frequency
    c. Prolonged replacement intervals of services infrastructure/systems or building fabric
    d. Dismantling and recycling or reuse of building components.

6. The model was updated during RIBA Work Stages D/E (design development/technical design) or equivalent.

Second credit

1. The first credit is achieved.

2. The results of the study have been implemented in the specification, design and final construction of the assessed building.

Compliance Notes	
New Build	There are no additional or different criteria to those outlined above specific to new-build projects.
Refurbishment	There are no additional or different criteria to those outlined above specific to refurbishment projects.
Extensions to existing buildings	There are no additional or different criteria to those outlined above specific to the assessment of extensions to existing buildings.
Fit Out Only	Issue not applicable for fit-out-only assessments

Schedule of Evidence Required

Req.	Design Stage	Post Construction Stage
First Credit		
1-4	A copy of the feasibility stage LCC analysis. The details of the cost consultant who has completed the analysis.	No additional evidence required to that outlined for the design stage of assessment.
5	A formal letter from the design team or cost consultant confirming: • The preferred option.	No additional evidence required to that outlined for the design stage of assessment.
6	An updated copy of the LCC analysis for the detailed and final design. **OR** A formal letter from the design team confirming: • The LCC analysis will be updated to reflect the detailed and final design proposals. • Any proposed change(s) made to the specification will be on the basis that they will minimise life cycle costs and impacts.	An updated copy of the LCC analysis for the final design.
Second Credit		
2	A formal letter from the design team confirming: • The option(s) with the lowest discounted life cycle costs have been, or will be, implemented in the design and specification.	Assessor's building/site inspection confirming: • The completed building reflects the preferred option identified in the LCC analysis.

Additional Information

Relevant definitions

Life Cycle Cost analysis: A procurement evaluation technique which determines the total cost of acquisition, operation, maintenance and disposal of the building.

The assessor should note that BREEAM places fixed criteria on the time at which the Life Cycle Cost feasibility study should be carried out in order that maximum benefit from undertaking this is achieved.

The *strategic level* analysis (looking at issues such as location and external environment, maintainability and internal environment, etc.) and *system level* analysis (looking at issues such as foundations, solid or framed wall and floors, types of energy, ventilation, water capacity, communications etc.) should be carried out early in the design process to influence the fundamental decisions taken regarding the building without having an adverse affect on either cost or design programme. It is however important that this is revisited as the design develops to ensure that an optimal solution is retained throughout the procurement process.

Real and discounted cost: ISO 15686[21] defines *real cost* as the cost expressed as a value at the base date, including estimated changes in price due to forecast changes in efficiency and technology, but excluding general price inflation or deflation. *Discounted cost* is the resulting cost when the real cost is discounted by the real discount rate, or when the nominal cost is discounted by the nominal discount rate. ISO15686 defines *nominal cost* as the expected price that will be paid when a cost is due to be paid, including estimated changes in price due to, for example, forecast change in efficiency, inflation or deflation and technology.

5.0 Health and Wellbeing

Issue ID	Issue Title	No. of credits available	Minimum standards
Hea 1	Daylighting	1 or 2 (dependant on building type)	No

Aim

To give building users sufficient access to daylight.

Assessment Criteria

The following demonstrates compliance:

First credit – All education building types

1. At least **80%** of floor area in *occupied spaces* for **pre-school**, **schools** and **further education colleges** and **60%** of floor area in *occupied spaces* for **higher education buildings** is adequately daylit as follows:

    a. An average daylight factor of 2% or more.

    PLUS either (b) **OR** (c **AND** d) below

    b. A uniformity ratio of at least 0.4 or a minimum point daylight factor of at least 0.8% (spaces with glazed roofs, such as atria, must achieve a uniformity ratio of at least 0.7 or a minimum point daylight factor of at least 1.4%).

    OR

    c. A view of sky from desk height (0.7m) is achieved.

    AND

    d. The room depth criterion $\mathbf{d/w + d/H_W < 2/(1-R_B)}$ is satisfied.
    Where:
    d = room depth
    w = room width
    H_W = window head height from floor level
    R_B = average reflectance of surfaces in the rear half of the room.

    Note: Table 7 Reflectance for maximum room depths and window head heights (see Additional Information) gives maximum room depths in metres for different room widths and window head heights of sidelit rooms

Second credit – Higher Education buildings only

1. At least 80% of floor area in *occupied areas* of higher education buildings is adequately daylit (as defined above).

Exemplary level criteria
The following outlines the exemplary level criteria to achieve an *innovation credit* for this BREEAM issue.

1. At least 80% of the floor area (for the building spaces/room identified above in the standard criteria) has an average daylight factor of 3% in multi-storey buildings and 4% in single-storey buildings.

2. The criteria outlined above concerning uniformity ratio, view of sky or room depth criterion are met. Where demonstrating compliance via uniformity ratio or point daylight factor the following minimum criteria apply:

    a. Multi-storey: A uniformity ratio of at least 0.4 or a minimum point daylight factor of at least 1.2%; (spaces with glazed roofs, such as atria, must achieve a uniformity ratio of at least 0.7 or a minimum point daylight factor of at least 2.1%).
    b. Single storey: a minimum point daylight factor of at least 1.6%; (spaces with glazed roofs, such as atria, must achieve a uniformity ratio of at least 0.7 or a minimum point daylight factor of at least 2.8%).

Compliance Notes	
New Build	There are no additional or different criteria to those outlined above specific to new-build projects.
Refurbishment	There are no additional or different criteria to those outlined above specific to refurbishment projects.
Extensions to existing buildings	The criteria of this issue apply only to the scope of the assessed building. If this scope includes the existing building as well as the new building then the relevant areas within the existing building must be assessed against the criteria of this BREEAM issue. If the assessment covers only the new building, then the areas in the existing building do not need to be assessed.
Fit Out only	There are no additional or different criteria to those outlined above specific to fit out-only projects.
Percentage of assessed area	Where the compliance requirement specifies that 80% of *office* or other *occupied space* floor area must be adequately daylit, it refers to 80% of the total floor area of all the rooms that must be assessed i.e. the compliant area. If for example a development has 6 rooms that must be assessed, each 150m^2 (total area 900m^2) then 720m^2 must comply with the criteria; this is equal to 4.8 rooms. The number of rooms that must comply must always be rounded up; therefore in this example, five rooms must have an average daylight factor of 2% or more (plus meet the other criteria) to achieve the credit.
View of sky requirement	To comply with the *view of sky* criteria at least 80% of the room that complies with the average daylight factor requirement must meet the view out requirement; i.e. it is permissible for up to 20% of the room not to meet the view of sky requirement and still achieve a compliant room.
Uniformity with rooflights	The room depth criteria cannot be used where the lighting strategy relies on rooflights. In such areas either appropriate software should be used to calculate the uniformity ratio or, in the case of a regular array of rooflights across the whole of the space, 'Figure 2.36' (p37) within CIBSE Lighting Guide LG10 can be used to determine the uniformity ratio.

Excluded areas	Media, arts production, SEN sensory spaces, x-ray rooms and other areas requiring strictly controlled acoustic or lighting conditions can be omitted from the assessment criteria. Sports hall exercise spaces should be included within the daylight calculations. In general, the assessor should use their professional judgement to establish which areas need to be exempted from the assessment of this issue. Any exclusion will need to be fully justified in the certification report.
Laboratories	Laboratory areas must be included within the definition of *occupied areas* unless the type of research that will be carried out requires strictly controlled environmental conditions, such as the exclusion of natural light at all times.
Two-side lit rooms	For rooms lit by windows on two opposite sides, the maximum room depth that can be satisfactorily daylit is twice the limiting room depth (d) (measured from window wall to window wall; CIBSE Lighting Guide LG10. The reflectance of the imaginary internal wall should be taken as 1.
Borrowed light	For areas where borrowed light is used, calculations or results from appropriate lighting design software must be provided to demonstrate that such areas meet the BREEAM criteria (if contributing to the percentage of compliant area). Examples of borrowed light include: light shelves, clerestory glazing, sun pipes or internal translucent/transparent partitions (such as those using frosted glass).

Schedule of Evidence Required

Req.	Design Stage	Post Construction Stage
All	Design plans for each floor in the building with each room/area appropriately labelled for use. **AND** Daylight calculations confirming: • Building areas assessed • The daylighting variables/criterion measured • Average daylight factor for each area • Compliance with room depth criterion, uniformity ratio, view of sky (if required) • The daylight provision is in compliance with the relevant standards.	Daylight calculations for the building 'as built' confirming compliance with all criteria. **OR** Assessor's site inspection report or 'as-built' drawings confirming: • The window sizes and room layout and dimensions are as per design-stage daylighting compliant room • A letter from the design team or main contractor confirming that window specification, size and/or room layout have not changed since the design stage assessment. Where there have been changes, revised calculations are required to demonstrate compliance for the relevant areas/rooms. **OR** Results from on-site measurements* that have been carried out. *These must be in accordance with methodology detailed in BRE IP 23/93[24].

Additional Information

Relevant definitions

Occupied space: A room or space within the assessed building that is likely to be occupied for 30 minutes or more by a building user (see also excluded areas in the compliance notes).

Point daylight factor: A point daylight factor is the ratio between the illuminance (from daylight) at a specific point on the working plane within a room, expressed as a percentage of the illuminance received on an outdoor unobstructed horizontal plane. This is based on an assumed overcast sky, approximated by the 'CIE (Commission Internationale de l'Eclairage) overcast sky'.

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.

Illuminance: The amount of light falling on a surface per unit area, measured in lux.

Uniformity: The uniformity is the ratio between the minimum illuminance (from daylight) on the working plane within a room (or minimum daylight factor) and the average illuminance (from daylight) on the same working plan (or average daylight factor).

View of sky / no-sky line: Areas of the working plane have a view of sky when they receive direct light from the sky, i.e. when the sky can be seen from working plane height. The no-sky line divides those areas of the working plane, which can receive direct skylight, from those that cannot.

Working plane: CIBSE LG10 defines the working plane as the horizontal, vertical or inclined plane in which a visual task lies. The working plane is normally taken as 0.7 m above the floor for offices and 0.85 m for industry.

Computer simulation: Software tools that can be used to model more complex room geometries for daylighting.

The table below gives maximum room depths in metres for different room widths and window head heights of sidelit rooms:

Table 7 Reflectance for maximum room depths and window head heights

Reflectance (R_B)	0.4		0.5		0.6	
Room Width (m)	3.0	10.0	3.0	10.0	3.0	10.0
Window Head Height (m)						
2.5	4.5	6.7	5.4	8.0	6.8	10.0
3.0	5.0	7.7	6.0	9.2	7.5	11.5
3.5	5.4	8.6	6.5	10.4	8.1	13.0

Issue ID	Issue Title	No. of credits available	Minimum standards
Hea 2	View Out	1	No

Aim

To allow occupants to refocus their eyes from close work and enjoy an external view, thus reducing the risk of eyestrain and breaking the monotony of the indoor environment.

Assessment Criteria

The following demonstrates compliance:

1. The *relevant building areas* are within 7m distance of a wall with a window or permanent opening providing an *adequate view out*, where the window/opening is ≥20% of the total inside wall area *(*refer to Compliance Notes for a definition of *relevant building areas* and *adequate view out)*.

   Where the room depth is greater than 7m, compliance is only possible where the percentage of window/opening is the same as or greater than the values in table 1.0 of BS 8206[25]

Compliance Notes	
New Build	There are no additional or different criteria to those outlined above specific to new-build projects.
Refurbishment	There are no additional or different criteria to those outlined above specific to refurbishment projects.
Extensions to existing buildings	There are no additional or different criteria to those outlined above specific to the assessment of extensions to existing buildings.
Fit Out	The criteria at this stage of assessment are the same as those identified at the design stage.
Adequate view out	The view out should ideally be through an external window providing a view of a landscape or buildings (rather than just the sky) at seated eye level (1.2 – 1.3m) in the *relevant building areas.* A view in to an internal courtyard or atrium will comply provided the distance from the opening to the back wall of the courtyard/atrium is at least 10m (therefore allowing enough distance for the eyes to refocus). The view cannot be an internal view across the room, as this is likely to become obstructed by partitions, filing cabinets etc.
High level windows	Roof lights and high level windows that do not provide an *adequate view out* do not meet the criteria for this BREEAM issue.
Relevant building areas	Where the term '*relevant building areas'* is referenced in this BREEAM issue it refers to any areas of the building where there are, or will be, workstations/benches or desks for building users.

Excluded areas	Workstations in the following spaces can be omitted from the assessment of this issue: • Media, arts production and SEN sensory spaces where activities requiring the exclusion or limitation of natural light is a functional requirement of the space. • Nurseries (children's desks only) • Conference rooms / lecture theatres • Laboratory areas where research/testing activities require permanent exclusion of daylight. • Sports halls/facilities (exercise spaces only) • Acute SEN (mild SEN rooms must meet the issue criteria)

Schedule of Evidence Required

Req.	Design Stage	Post Construction Stage
All	Design plan and elevation showing: • All *relevant building areas* and room depths • Actual or notional workstations/desk layout • Window/open areas Site plan showing: • Building location and proximity to external obstructions.	Assessor's site inspection report and photographic evidence confirming: • All *relevant building areas* comply. **OR** As built drawings or a formal letter form the design team confirming: • No changes have occurred since design stage, therefore design stage evidence demonstrates compliance post construction.

Additional Information

Relevant definitions

Occupied space: refer to BREEAM issue Hea 1.

Issue ID	Issue Title	No. of credits available	Minimum standards
Hea 3	Glare Control	1	No

Aim

To reduce problems associated with glare in occupied areas through the provision of adequate controls.

Assessment Criteria

The following demonstrates compliance:

1. An occupant-controlled shading system on all windows, glazed doors and rooflights in all *relevant building areas*.

Compliance Notes	
New Build	There are no additional or different criteria to those outlined above specific to new-build projects.
Refurbishment	There are no additional or different criteria to those outlined above specific to refurbishment projects.
Extensions to existing buildings	Where the existing building falls within the scope of the assessment, then the criteria extend to the *relevant building areas* and *occupied spaces* of the existing building. If only the new extension is being assessed then the criteria apply to the relevant areas of the new building.
Fit Out Only	There are no additional or different criteria to those outlined above specific to fit out-only assessments.
Relevant building areas	Where the term '*relevant building areas'* is referenced in this BREEAM issue it refers to any areas of the building where there are, or will be, workstations/benches, desks and/or close work will be undertaken or visual aids used.
Excluded areas	The following spaces are omitted from the assessment of this issue: • Media and arts production spaces • Sports facilities (exercise spaces only)
Workshops	For workshops, to avoid unduly high maintenance due to dust/dirt, compliance can be also be demonstrated in such areas by designing out glare through measures such as Brise-soleil, low eaves, bioclimatic design or blinds integral to the window.
Nurseries / Acute SEN	In pre-schools and schools, where childcare and acute SEN spaces are included within the scope of the development, occupant control need be provided only for the teacher in these spaces.

Schedule of Evidence Required

Req.	Design Stage	Post Construction Stage
1	Marked-up copy of the design plan(s) confirming: • A description of the function of each of the building spaces. A copy of the relevant specification clause(s), window schedule or design plan confirming: • Type of shading system(s) and control to be installed.	Assessor's building/site inspection and photographic evidence confirming: • Installation of compliant glare control system.

Additional Information

Relevant definitions

Occupied space: A room or space within the assessed building that is likely to be occupied for 30 minutes or more by a building user and, with respect to this issue, where it would be desirable to limit the potential for glare or provided a system of glare control.

Issue ID	Issue Title	No. of credits available	Minimum standards
Hea 4	High frequency lighting	1	Yes

Aim

To reduce the risk of health problems related to the flicker of fluorescent lighting.

Assessment Criteria

The following demonstrates compliance:

1. All fluorescent and compact fluorescent lamps are fitted with high frequency ballasts.

Compliance Notes	
New Build	There are no additional or different criteria to those outlined above specific to new-build projects.
Refurbishment	There are no additional or different criteria to those outlined above specific to refurbishment projects.
Extensions to existing buildings	Where the existing building falls within the scope of the assessment, then the criteria extend to the existing building. If only the new extension is being assessed then the criteria apply to the new building only.
Fit Out Only	There are no additional or different criteria to those outlined above specific to fit out-only assessments.

Schedule of Evidence Required

Req.	Design Stage	Post Construction Stage
1	A copy of the specification clause or room data sheets confirming: • A compliant lighting strategy.	Assessor's building/site inspection and photographic evidence confirming: • Installation of high frequency ballasts. **OR** As-built drawings/specification confirming: • No changes have occurred since design stage assessment. • Where changes have occurred, a compliant lighting strategy is installed.

Additional Information

Relevant definitions

Occupied space: refer to BREEAM issue Hea 1.

High frequency ballast: High frequency ballasts increase the frequency of the power coming from the grid (50Hz) to a frequency optimising the performance of fluorescent lamps, typically around 30kHz.

There are several advantages to running fluorescent lamps at higher frequencies. At 30kHz, the frequency of re-ignition of a fluorescent lamp is too quick to be detected by the human eye, therefore reducing visible flicker that some fluorescent lamps running on mains frequency fail to do. Additionally, 30kHz being above the audible range of the human ear, the buzzing noise coming out of low quality main frequency ballasts is avoided. Finally, the luminous efficacy of fluorescent lamps increases with frequency; it can be optimised by up to 10% when they are running at 30kHz compared to those operating at 50Hz.

Issue ID	Issue Title	No. of credits available	Minimum standards
Hea 5	Internal and external lighting levels	1	No

Aim

To ensure lighting has been designed in line with best practice for visual performance and comfort.

Assessment Criteria

The following demonstrates compliance:

1. Illuminance (lux) levels in all internal areas of the building are specified in accordance with the CIBSE Code for Lighting 2006[26].

   Pre-schools, schools and sixth form colleges
   In addition to the above requirement, internal illuminance levels in classrooms must be specified in accordance with Building Bulletin 90: '*Lighting Design for Schools*'[27].

2. For areas where computer screens are regularly used, the lighting design complies with CIBSE Lighting Guide 7[28] sections 3.3, 4.6, 4.7, 4.8 and 4.9. This gives recommendations highlighting:

   a. Limits to the luminance of the luminaires, to avoid screen reflections. (Manufacturers' data for the luminaires should be sought to confirm this).
   b. For up-lighting, the recommendations refer to the luminance of the lit ceiling rather than the luminaire; a design team calculation is usually required to demonstrate this.
   c. Recommendations for direct lighting, ceiling illuminance, and average wall illuminance.

3. Illuminance levels for lighting in all external areas within the *construction zone* are specified in accordance with CIBSE Lighting Guide 6, '*The outdoor environment*'[29].

Compliance Notes	
New Build	There are no additional or different criteria to those outlined above specific to new-build projects.
Refurbishment	There are no additional or different criteria to those outlined above specific to refurbishment projects.
Extensions to existing buildings	Where the existing building falls within the scope of the assessment, then the criteria extend to the existing building. If only the new extension is being assessed then the criteria apply to the areas of the new building only.
Fit Out Only	There are no additional or different criteria to those outlined above specific to fit out-only assessments.
No external areas	Where no external light fittings are specified, the criteria relating to external lighting do not apply and the credit can be awarded on the basis of compliance with the internal lighting criteria.

Schedule of Evidence Required

Req.	Design Stage	Post Construction Stage
All	**EITHER** A copy of the specification or relevant room schedules confirming: • The internal/external maintained illuminance levels **AND/OR** • The standards that the illuminance levels are specified to. **OR** A formal written declaration of conformity from the relevant member of the design team confirming: • The maintained illuminance levels for each internal/external space are in compliance with the relevant Standard.	A formal written declaration from the design team or main contractor confirming: • Light fittings have been installed in compliance with the lighting specification. • No changes have occurred in the lighting specification used to demonstrate design stage compliance. Where changes have occurred, a further declaration is required confirming that the revised lighting specification is in compliance with the BREEAM criteria.

Additional Information

Relevant definitions

Occupied space: Refer to BREEAM issue Hea 1.

Construction zone: For the purpose of this BREEAM issue the construction zone is defined as the site which is being developed for the BREEAM-assessed building, and the external site areas that fall within the scope of the new works.

Issue ID	Issue Title	No. of credits available	Minimum standards
Hea 6	Lighting zones and controls	1	No

Aim

To ensure occupants have easy and accessible control over lighting within each *relevant building area*.

Assessment Criteria

The following demonstrates compliance:

Pre-schools, schools and sixth form colleges

1. Lighting is zoned to allow *separate occupant control* of the following areas (where applicable):

    a. Teaching space/demonstration area
    b. Whiteboard/display screen
    c. In office areas, zones of no more than four workplaces.
    d. Workstations adjacent to windows/atria and other building areas separately zoned and controlled.

2. Manual lighting controls should be easily accessible for the teacher whilst teaching and on entering/leaving the teaching space.

Further and Higher Education colleges only

1. Zoning of lighting control allows for varying occupancy and/or uses within each space, appropriate to the usage of that space. In particular, lighting is zoned to allow *separate occupant control* as follows:

    a. Office and circulation spaces
    b. In office areas: zones of no more than four workplaces
    c. Workstations adjacent to windows/atria and other building areas separately zoned and controlled
    d. Seminar and lecture rooms: zoned for presentation and audience areas
    e. Library spaces: separate zoning of stacks, reading and counter areas
    f. Auditoria: zoning of seating areas, circulation space and lectern area
    g. Dining, restaurant, café areas: separate zoning of servery and seating/dining areas
    h. Retail: separate zoning of display and counter areas
    i. Bar areas: separate zoning of bar and seating areas.

    For rooms/spaces not listed above, the assessor can exercise an element of judgement when determining whether what is specified is appropriate for the space given its end use and the aim and criteria of this BREEAM issue.

2. Areas used for teaching, seminar or lecture purposes (not listed above) have lighting controls provided in accordance with CIBSE Lighting Guide 5[30]. The controls specified will depend on the size and use of the space but a typical auditorium or lecture theatre with stepped seating and a formal lectern/demonstration/performance area would typically be expected to have lighting controls as follows:

a. Full normal lighting (to allow for entry/exit, cleaning etc.)
b. Audience area lighting reduced to a low level and demonstration area lighting off; for the purpose of line slide projection, but allowing enough light for the audience to take notes
c. All lighting off; for the projection of tone slides, colour slides, and for the purposes of visual demonstrations/performances.
d. Separate localised lectern lighting.

Compliance Notes	
New Build	There are no additional or different criteria to those outlined above specific to new-build projects.
Refurbishment	There are no additional or different criteria to those outlined above specific to refurbishment projects.
Extensions to existing buildings	There are no additional or different criteria to those outlined above specific to new building extensions to existing buildings.
Fit Out Only	There are no additional or different criteria to those outlined above specific to fit out-only projects.
Occupancy / workstation layout unknown	Where occupancy/workstation layout is not known, lighting control can be zoned on the basis of 40m^2 grids i.e. an assumption of 1 person/workspace per 10m^2.
Small spaces	Where the building consists entirely of small rooms/spaces (less than 40m^2) which do not require any subdivision of lighting zones/control or meet the criteria by default, then this credit may be awarded.
Excluded areas	The following areas/spaces are omitted from the assessment of this issue: • Media and arts production spaces • Sports facilities (exercise spaces only)
Nurseries / acute SEN	Where child care and/or acute SEN spaces are included within the scope of the assessment, lighting controls should be provided for the teacher/member of staff, i.e. it is not a necessity for the controls to be accessible to the children.

Schedule of Evidence Required

Req.	Design Stage	Post Construction Stage
All	Design plans for each floor of the building highlighting: • Space arrangement and room type **AND** Specification or design plans confirming: • Lighting zones • Location and scope of user-controls.	Assessor's site inspection report, or as-built drawings/specification confirming: • No changes have occurred since design stage; therefore, design stage evidence can be used to demonstrate compliance at post construction stage. • Where changes have occurred since design stage, the amended features still comply with the design stage criteria.

Additional Information

Relevant definitions

Separate Occupant Control: Light switches/controls for a particular area/zone of the building that can be accessed and operated by the individual(s) occupying that area/zone. Such controls will be located within, or within the vicinity of, the zone/area they control.

Issue ID	Issue Title	No. of credits available	Minimum standards
Hea 7	Potential for Natural Ventilation	1	No

Aim

To recognise and encourage adequate cross flow of air in naturally ventilated buildings and flexibility in air-conditioned/mechanically ventilated buildings for future conversion to a natural ventilation strategy.

Assessment Criteria

The following demonstrates compliance:

1. *Occupied spaces* of the building are designed to be capable of providing fresh air entirely via a natural ventilation strategy, demonstrated via **EITHER** of the following:

    a. The *openable window area* in each *occupied space* is equivalent to 5% of the gross internal floor area of that room/floor plate. For room/floor plates between 7m-15m depth, the *openable window area* is on opposite sides and evenly distributed across the area to promote adequate cross-ventilation. **OR**
    b. The optimal location and size of openable area required to achieve the appropriate ventilation rate using a natural ventilation strategy has been determined using the *ClassVent tool* or other appropriate ventilation design tools i.e. types recommended by CIBSE AM10[31].

    For a strategy which does not rely on *openable windows*, or which has *occupied spaces* with a plan depth greater than 15m, the design must demonstrate (by calculation in accordance with requirement 1b above) that the ventilation strategy can provide adequate cross flow of air to maintain the required thermal comfort conditions and ventilation rates.

2. The strategy is capable of providing at least two levels of user-control on the supply of fresh air to the *occupied space* with higher rates of ventilation achievable to remove short-term odours and/or prevent summertime overheating.

    This would typically be demonstrated by providing a large enough area of manually opening windows or powered window actuators. Any opening mechanisms must be easily accessible and provide adequate user-control over air flow rates to avoid draughts.

3. The natural ventilation strategy is capable of providing adequate levels of draught-free fresh air to meet the need for good indoor air quality throughout the year, sufficient for the occupancy load and the internal pollution loads of the space (as defined by BB101[32]).

4. For mechanically ventilated buildings/spaces, all mechanical actuators are silent in operation, can be overridden by the building user and are fully modulating rather than the open/closed type.

Compliance Notes	
New Build	There are no additional or different criteria to those outlined above specific to new-build projects.
Refurbishment	There are no additional or different criteria to those outlined above specific to refurbishment projects.

Extensions to existing buildings	Where the existing building falls within the scope of the assessment, then the criteria extend to the existing building. If only the new extension is being assessed then the criteria apply to the areas of the new building only.
Fit Out Only	There are no additional or different criteria to those outlined above specific to fit out-only projects.
Mechanically ventilated/cooled buildings	The aim of this BREEAM issue is to ensure that a building is capable of providing fresh air using a natural ventilation strategy. As a result, buildings that employ a mechanically ventilated/cooled strategy are still able to achieve the credit, provided they can demonstrate compliance with the above criteria (for future adaptability).
Openable window area	The *openable window area* is defined as the geometric free ventilation area created when a ventilation opening, e.g. window, is open to its normal operational fully designed extent (i.e. this excludes open areas created when reversible windows are opened for cleaning etc). It is not the glazed area of a façade or the glazed area of the part of the window that is openable (unless it opens fully).
Spaces requiring local exhaust ventilation	*Occupied spaces* requiring local exhaust ventilation e.g. labs, workshops, food technology rooms must still demonstrate that they meet the criteria for *potential for natural ventilation*.
Excluded occupied spaces	The following building areas can be excluded from the definition of *occupied spaces*: • Swimming pools • Catering and small staff kitchens • Washrooms/changing areas • Laboratory or other area where strictly controlled environmental conditions are a functional requirement of the space.

Schedule of Evidence Required

Req.	Design Stage	Post Construction Stage
1-2	Design plans and elevations, specification or calculations confirming: • Ventilation strategy in each *occupied space* • The depth of the room • Gross internal floor area of each *occupied space* • The type of window/ventilator and total *openable area* * • The location of openings • The type and degree of user-control. **AND** (where relevant) A copy of the results from the appropriate software modelling tool demonstrating compliance. *Manufacturers'/suppliers' literature may also be used as evidence.	Assessor's site inspection report and photographic evidence confirming: • The ventilation openings and controls are installed in accordance with compliant design stage evidence. * A formal letter from the design team or main contractor confirming: • No changes have occurred since design stage. Where changes have occurred since design stage, 'as-built' drawings, specification and calculations (as outlined under design stage evidence) that re-confirms compliance. * A random spot check of a selection of *occupied spaces* is sufficient. The assessor is not required to check each opening in all spaces/rooms.

3&4	A copy of the relevant clause of the specification confirming: • The natural ventilation strategy minimises ingress of pollutants in accordance with Building Bulletin 101 (section 3.0). **AND** (if relevant) • The type and controls for the mechanical actuators. **OR** A formal letter from the design team confirming the above bullet points.	As outlined above.

Additional Information

Relevant definitions

Occupied space: refer to BREEAM issue Hea 1.

ClassVent: ClassVent is a customised spreadsheet design tool that provides a means of sizing ventilation openings for a natural ventilation strategy for school classrooms. The tool was developed by the Department for Children, Families and Schools (formerly DfES). The tool can be downloaded from http://www.teachernet.gov.uk/docbank/index.cfm?id=9955

Issue ID	Issue Title	No. of credits available	Minimum standards
Hea 8	Indoor Air Quality	1	No

Aim

To reduce the risk to health associated with poor indoor air quality.

Assessment Criteria

The following demonstrates compliance:

1. **Air-conditioned and mixed-mode buildings**: Where the building's air intakes and exhausts are over 10m apart to minimise recirculation **AND** intakes are over 20m from *sources of external pollution*.

2. **Naturally-ventilated buildings**: Where openable windows/ventilators are over 10m from *sources of external pollution*.

3. In addition to the specific BREEAM criteria above, the building has been designed to provide fresh air and minimise internal pollutants (and ingress of external polluted air into the building) in accordance with the criteria of Building Bulleting 101*Ventilation of School Buildings*[32].

Compliance Notes	
New Build	There are no additional or different criteria to those outlined above specific to new-build projects.
Refurbishment	There are no additional or different criteria to those outlined above specific to refurbishment projects.
Extensions to existing buildings	There are no additional or different criteria to those outlined above specific to the assessment of extensions to existing buildings.
Fit Out only	There are no additional or different criteria to those outlined above specific to fit out-only projects.
Measuring the distance	The distance requirement does not necessarily mean the plan distance, but the three dimensional distance around and over objects; e.g. on plan the air intakes may be less than 20m from a source of external pollution, but the intake may be on the roof of a 10 storey building and therefore over 20m from the source of pollution.
Sources of external pollution	This includes the following: • Highways and the main access roads on the assessed site. • Car parks and delivery/vehicle waiting bays • Other building exhausts, including from building services plant industrial/agricultural processes
Excluded sources	Service and access roads with restricted and infrequent access (for example roads used only for waste collection) are unlikely to represent a significant source of external pollution. These roads can therefore be excluded from the criteria of this issue. This does not include vehicle pick-up/drop-off or waiting bays.
Filters	It must be noted that filters fitted on the air supply are not considered by BREEAM to provide adequate protection from sources of external pollution. As such the distance criteria cannot be relaxed where filters are specified.

Schedule of Evidence Required

Req.	Design Stage	Post Construction Stage
1&2	A marked-up proposed site plan highlighting: • Locations of intakes, extracts, openable windows, ventilators • Any existing or proposed sources of external pollution.	Assessor's building/site inspection and as built drawings confirming: • Locations of intakes, extracts, openable windows, ventilators • Proximity of any sources of external pollution to the above.
3	Design team calculations and/or performance specification criteria confirming: • The fresh air rate set for each space • That the fresh air rate can be met using the chosen strategy • The relevant standard(s) to which the design is in accordance with.	For a naturally ventilated building, a formal letter of declaration from the design team or main contractor confirming the building has been built in accordance with a design compliant with the BREEAM criteria. For a mechanically ventilated building, the commissioning manager's performance testing report confirming: • The required fresh air rates are achieved.

Additional Information

Relevant definitions
None.

Issue ID	Issue Title	No. of credits available	Minimum standards
Hea 9	Volatile Organic Compounds	1	No

Aim

To recognise and encourage a healthy internal environment through the specification of internal finishes and fittings with low emissions of volatile organic compounds (VOCs).

Assessment Criteria

The following demonstrates compliance:

1. The following products (where specified) have been tested against and meet the relevant standards outlined in the table below for Volatile Organic Compound (VOC) emissions:

Table 8 VOC criteria by product type

Product	European Standard	Emission level required
Wood Panels • Particleboard, • Fibreboard including MDF, • OSB, • Cement-bonded particleboard • Plywood • Solid wood panel and acoustic board	BS EN 13986:2004[33]	Formaldehyde E1 (Testing req 1 – see below) Verify that regulated wood preservatives are absent and of the minimum content.
Timber Structures • Glued laminated timber	BS EN 14080:2005[34]	Formaldehyde E1 (Testing req 1)
Wood flooring • e.g. parquet flooring	BS EN 14342:2005[35]	Formaldehyde E1(Testing req 1) Verify that regulated wood preservatives are absent and of the minimum content.
Resilient, textile and laminated Floor coverings • Vinyl/linoleum • Cork and rubber • Carpet • Laminated wood flooring	BS EN 14041:2004[36]	Formaldehyde E1(Testing req 1) Verify that regulated preservatives are absent and of the minimum content.
Suspended ceiling tiles	BS EN 13964:2004[37]	Formaldehyde E1 (Testing req 1) No asbestos.
Flooring adhesives	BS EN 13999-1:2007[38]	Verify that carcinogenic or sensitising volatile substances are absent (Testing req. 2-4).
Wall-coverings • Finished wallpapers • Wall vinyl's and plastic wall-coverings • Wallpapers for subsequent decoration. • Heavy duty wall-coverings • Textile wall-coverings	BS EN 233:1999[39] BS EN 234:1989[40] BS EN 259:2001[41] BS EN 266:1992[42]	Formaldehyde (testing req. 5) and Vinyl chloride monomer (VCM) (testing req. 5) release should be low and within the BS EN standard for the material. Verify that the migration of heavy metals(5) and other toxic substances are within the BS EN

		standard for the material.
Adhesive for hanging flexible wall-coverings	BS 3046:1981[43]	No harmful substances and preservatives used should be of minimum toxicity.
Decorative paints and varnishes	BS EN 13300:2001[44] referred to the criteria of Decorative Paint Directive 2004/42/CE[45]	VOC (organic solvent) content (testing req. 6), requirement for Phase 2. Fungal and algal resistant.
Testing requirement: 1. BS EN 717-1:2004[46] 2. BS EN 13999-2:2007 - Volatile Organic Compounds (VOCs)[47] 3. BS EN 13999-3:2007 - Volatile aldehydes[48] 4. BS EN 13999-4:2007 - Volatile diisocyanates[49] 5. BS EN 12149:1997[50] 6. BS EN ISO 11890-2:2006[51]		

Compliance Notes	
New Build	There are no additional or different criteria to those outlined above specific to new-build projects.
Refurbishment	There are no additional or different criteria to those outlined above specific to refurbishment projects.
Extensions to existing buildings	There are no additional or different criteria to those outlined above specific to the assessment of extensions to existing buildings.
Fit Out only	There are no additional or different criteria to those outlined above specific to shell-only assessments.
Products with no Formaldehyde containing materials	For some floor coverings and wood based panels, the requirement for formaldehyde testing (referred to in the above criteria) does not apply to "*floor coverings to which no formaldehyde-containing materials were added during production or post-production processing*"[36], or in the case of EN 13986:2002, wood-based panels. As such, if a product manufacturer confirms that they have made a declaration of Formaldehyde class E1 without testing (in writing or via a company product fact sheet/literature) then the product in question meets the BREEAM requirement relevant to Formaldehyde testing. A declaration of E1 without testing is effectively confirmation from the manufacturer that formaldehyde emissions comply with the emission level requirements of the relevant standard(s) Therefore, evidence confirming the actual emission level(s) via testing will not be required by the Assessor to demonstrate compliance with that particular requirement.
Furnishings	The scope of this BREEAM issue does not extend to furnishings e.g. desks/shelving, it focuses on the key internal finishes and fittings integral to the building.

Schedule of Evidence Required

Req.	Design Stage	Post Construction Stage
1	A copy of the relevant specification clause confirming: • The VOC content of the relevant specified product types will comply with the standards specified above.	For each relevant product, a formal letter from or copies of the manufacturer's literature confirming: • The standard(s) against which the product is tested • The VOC emissions achieved • The VOC emissions meet the required level.

Additional Information

Relevant definitions
None.

Volatile Organic Compounds
VOCs are emitted by a wide array of products numbering in the thousands. Examples include: paints and lacquers, paint strippers, cleaning supplies, pesticides, building materials and furnishings, glues and adhesives, Urea-formaldehyde foam insulation (UFFI), pressed wood products (hardwood plywood wall panelling, particleboard, fibreboard) and furniture made with these pressed wood products.

'No' or 'low' VOC paints are available from most standard mainstream paint manufacturers. There 'eco-friendly' paints are made from organic plant sources and also powdered milk-based products. The emissions of VOCs from paints and varnishes are regulated by the Directive 2004/42/CE, implemented in the UK by the Volatile Organic Compounds in Paints, Varnishes and Vehicle Refinishing Products Regulation 2005. Products containing high organic solvent content should also be avoided (EU VOC Solvent Directive 1999/13/EC).

Exposure risk assessment of any possible release of chemicals from manufactured products and their possible impact on health and the environment generally, is an important requirement of European regulations. The possible impact of a building product on indoor air quality is included in the European Construction Products Directive, 89/106/EEC. The amended Directive, 93/68/EEC provided the criteria for CE Marking of products.

Products to be fitted in buildings should not contain any substances regulated by the Dangerous Substances Directive 2004/42/CE, which could cause harm to people by inhalation or contact. Materials containing heavy metals (e.g. antimony, barium, cadmium, lead and mercury) and other toxic elements (e.g. arsenic, chromium and selenium) or regulated biocides (e.g. pentachlorophenol) should be avoided.

Various labelling schemes identify products that have been tested and shown to be low emitting and these have been summarised in BRE Digest 464[52].

Dangerous substances are defined in the Dangerous Substances Directive (67/548/EEC)

Issue ID	Issue Title	No. of credits available	Minimum standards
Hea 10	Thermal Comfort	1	No

Aim

To ensure, with the use of design tools, that appropriate thermal comfort levels are achieved.

Assessment Criteria

The following demonstrates compliance:

1. Thermal modelling has been carried out using software selected and applied in accordance with CIBSE AM11 *Building Energy and Environmental Modelling*[53].

Pre-schools, schools and sixth form colleges

2. The modelling demonstrates that the building design and services strategy provides internal summer temperatures significantly better than the recommendations of Building Bulletin 101[32] e.g. there are fewer than 60 hours a year where temperatures rise above 28°C.

3. The software used to carry out the simulation at the detailed design stage provides *full dynamic thermal analysis*. For more basic school buildings where an AM11 full dynamic model is not suitable then compliance with this issue can be determined using *ClassCool*.

Further and Higher Education Colleges

2. The modelling demonstrates that the building design and services strategy can deliver thermal comfort levels in *occupied spaces* in accordance with the criteria set out in CIBSE Guide A *Environmental Design*[54]; in particular that internal winter and summer temperature ranges will be in line with the recommended comfort criteria in table 1.5 of the Guide.

3. The software used to carry out the simulation at the detailed design stage must provide *full dynamic thermal analysis*. For smaller and more basic building designs an alternative less complex means of analysis may be appropriate (such methodologies must still be selected and applied in accordance with CIBSE AM11).

Compliance Notes	
New Build	There are no additional or different criteria to those outlined above specific to new-build projects.
Refurbishment	There are no additional or different criteria to those outlined above specific to refurbishment projects.
Extensions to existing buildings	Where the existing building falls within the scope of the assessment, then the criteria extend to all *occupied spaces* of the new and existing building. If only the new extension is being assessed then the criteria apply to the occupied areas of the new building.
Fit Out Only	There are no additional or different criteria to those outlined above specific to the assessment of fit out-only projects.

Schedule of Evidence Required

Req.	Design Stage	Post Construction Stage
1&3	A copy of the relevant specification clause confirming: • The criteria for thermal comfort analysis. **OR** Correspondence (e.g. letter, email or meeting minutes) from the design team confirming: • The name of the thermal comfort modelling software used. • The software has been selected and applied in accordance with CIBSE AM11.	Formal written confirmation from the design team confirming: • No changes have occurred since design stage thermal comfort assessment was carried out, therefore design stage evidence demonstrates compliance at the post construction stage. Where changes have occurred, an updated copy of the results from the modelling demonstrating the internal temperatures in compliance with the relevant standards.
2	A copy of the results from the modelling demonstrating the internal temperatures in compliance with the relevant standards.	

Additional Information

Relevant definitions

ClassCool: A tool developed by the Department for Children, Schools and Families (DCSF, formerly DfES) which provides a simplified method of assessing the extent of classroom overheating. ClassCool may not be appropriate for other spaces, such as libraries and halls, and other means of assessing overheating will be required www.teachernet.gov.uk/iaq.

Occupied space: For the purpose of this BREEAM issue an occupied space is a room or space within the assessed building that is likely to be occupied for 30 minutes or more by a building user. The definition excludes the following:

a. Atria/concourses
b. Entrance halls/reception areas
c. Ancillary space e.g. circulation areas, storerooms and plantrooms

Thermal Dynamic Analysis: Thermal comfort analysis tools can be subdivided into a number of methods of increasing complexity. The most complex of these and the one that provides greatest confidence in results is the full dynamic model. This type of model enables annual heating/cooling loads, overheating risks and control strategies to be assessed.

Issue ID	Issue Title	No. of credits available	Minimum standards
Hea 11	Thermal Zoning	1	No

Aim

To recognise and encourage the provision of user controls which allow independent adjustment of heating/cooling systems within the building.

Assessment Criteria

The following demonstrates compliance:

1. The heating/cooling system is designed to allow *occupant control* of zoned areas within all *occupied spaces* in the building.

2. The zoning allows *separate occupant control* (within the *occupied space*) of each perimeter area (i.e. within 7m of each external wall) and the central zone (i.e. over 7m from the external walls).

Compliance Notes	
New Build	There are no additional or different criteria to those outlined above specific to new-build projects.
Refurbishment	There are no additional or different criteria to those outlined above specific to refurbishment projects.
Extensions to existing buildings	Where the existing building falls within the scope of the assessment, then the criteria extend to the *occupied spaces* of the existing building. If only the new extension is being assessed then the criteria apply to the relevant spaces of the new building.
Fit Out only	There are no additional or different criteria to those outlined above specific to fit out-only projects.
Long lag systems	Where *long-lag systems* are specified, the criteria can be met where they are designed to service the base load only and a responsive secondary heating system and controls are provided, zoned in compliance with the above criteria.
Distance requirement	The distance requirement is approximate; however, the assessor must use sound judgement considering fully the aims of this issue, before accepting solutions that do not strictly meet the above criteria.
Controls for wet heating systems	Adequate TRVs (thermostatic radiator valves) placed in zones around the building perimeter, and the provision of local occupant controls to internal areas, such as fan coil units, would satisfy the criteria for this BREEAM issue.
Occupant controls	In pre-schools and schools occupant controls are intended to be for staff use only, not pupils.
Excluded areas	The following spaces are omitted from the assessment of this BREEAM issue: • Media, arts production and *SEN* sensory spaces • Main halls and sports facilities (exercise spaces only)

Schedule of Evidence Required

Req.	Design Stage	Post Construction Stage
1&2	A copy of the relevant clauses of specification and/or marked-up M&E drawings confirming: • Scope of the heating/cooling system • The type of user controls for the above systems • The scope of the controls i.e. control zone.	Assessor's building/site inspection and photographic evidence confirming: • Installation of user controls in each *occupied space.** *For large buildings it would not be expected that the assessor check every individual *occupied space*, but a random selection of spaces that confirm compliance.

Additional Information

Relevant definitions

Long-lag systems: These low temperature systems use the thermal mass of the building to provide a consistent supply of heat to the space during the occupied period. As the mass of the building is used to regulate and supply the heat, the temperature in the space lags behind any change required by the occupants via the systems controls. An example of a long-lag system is under-floor heating.
Separate Occupant Control: Heating/cooling controls for a particular area/zone of the building that can be accessed and operated by the individual(s) occupying that area/zone. Such controls will be located within, or within the vicinity of, the zone/area they control.

Occupied space: For the purpose of this BREEAM issue an occupied space is a room or space within the assessed building that is likely to be occupied for 30 minutes or more by a building user. The definition excludes areas where building users would not expect, or be expected, to control temperature in the space, including the following:

a. Atria/association space
b. Entrance halls/reception areas
c. Circulation areas
d. Storerooms

Special Educational Needs (SEN): The Government's Department for Children, Families and Schools (DCFS) defines children with SEN as having "*learning difficulties or disabilities which make it harder for them to learn or access education than most other children of the same age*". Some schools have facilities dedicated to the education of children with special educational needs.

Issue ID	Issue Title	No. of credits available	Minimum standards
Hea 12	Microbial Contamination	1	Yes

Aim

To ensure the building services are designed to reduce the risk of legionellosis in operation.

Assessment Criteria

The following demonstrates compliance:

1. All *water systems* in the building are designed in compliance with the measures outlined in the Health and Safety Executive's "*Legionnaires' disease - The control of legionella bacteria in water systems*". Approved Code of Practice and guidance, 2000[55].

2. Where no humidification is specified or only steam humidification is provided.

Compliance Notes	
New Build	There are no additional or different criteria to those outlined above specific to new-build projects.
Refurbishment	There are no additional or different criteria to those outlined above specific to refurbishment projects.
Extensions to existing buildings	If the extended and existing building share the same water systems, then these systems must be assessed against the criteria regardless of whether the existing building forms a part of the assessment or not. If the extension is served by independent systems, only these need be assessed against the Assessment Criteria. If it is the intention that building users of the extended building will use water systems in the existing building, then it must be confirmed that the existing systems comply with the criteria.
Fit Out Only	Any and all existing and new water systems in the fitted-out building/unit must comply with the BREEAM criteria. In some instances responsibility for water systems may lie with a landlord and not the tenant; in such cases confirmation will be required from the landlord, or their representative, confirming that the water system comply with ACoP.
CIBSE TM13	Design teams may refer to CIBSE TM13 *Minimising the risk of Legionnaires disease*, 2002[56] in demonstrating that the design meets the criteria of ACoP.
Assessor's responsibility	The BREEAM assessor **is not** required to confirm that the design is compliant with the relevant standard; this is the responsibility of the design team. The assessor is simply required to record, for the purposes of validation, whether or not the design team confirms compliance.

Schedule of Evidence Required

Req.	Design Stage	Post Construction Stage
1&2	A copy of the relevant specification clause(s) confirming: • All types of water system in the building and on the assessed site. • The standards to which all water systems in the building will be designed. Where design responsibility is to be passed on to the contractor/installer, a copy of the relevant specification clause(s) stating: • The criteria on the contractor/installer with regards to minimising the risk of Legionnaires disease from the specified water systems.	For all water systems in the building, a formal letter of declaration from the design team, main contractor or installer of the relevant systems confirming: • The design and installed systems comply with the HSE's ACoP. • If relevant, any existing water systems comply with the HSE's ACoP.

Additional Information

Relevant definitions

Water systems: For the purpose of this issue, this refers to:

- Cooling towers
- Evaporative condenser
- Domestic hot and cold water systems
- Other plant and systems containing water which is likely to exceed 20°C and which may release a spray or aerosol during operation or when being maintained, for example:
    - humidifiers and air washers
    - spa baths and pools
    - car/bus washes
    - wet scrubbers
    - Indoor fountains and water features.

Legionnaires disease: The HSE describes Legionnaires disease as a type of pneumonia caused by the bacterium Legionella pneumophilia. People catch Legionnaires' disease by inhaling small droplets of water suspended in the air, which contain the bacteria.

Humidification Units

Humidification options fall into two broad groups; the first group relies on a heated air stream evaporating water vapour either from a pond or stream of water. This includes so-called 'trickle-down' systems. These are dependent on sterilisation technologies such as UV, ultrasonic etc, to ensure that the water vapour is not contaminated. Whilst these systems are effective when working properly, any partial failure will allow untreated water into a warmed air stream. Where this occurs, the health-related consequences are likely to be significant.

The second group relies on failsafe systems that minimise risk if the plant fails. The only option in this group is steam humidification. This process sterilises the water vapour and ensures that untreated water cannot enter the air stream when no steam is being produced.

Issue ID	Issue Title	No. of credits available	Minimum standards
Hea 13	Acoustic Performance	2 or 3 (dependant on building type)	No

Aim

To ensure the acoustic performance of the building meets the appropriate standards for its purpose.

Assessment Criteria

The following demonstrates compliance:

Pre-schools, schools and sixth form colleges only

First credit

1. The building meets the acoustic performance standards required by Building Bulletin 93[57].

2. Pre-completion acoustic testing is carried out by a *suitably qualified acoustician* as described in BB93 to ensure that all relevant spaces (as built) achieve the required performance standards. Any remedial works required in spaces that do not meet the standards (as identified via testing) are completed prior to handover and occupation.

Schools and sixth form colleges only

Second credit

3. *New build only*: For music accommodation (or multi-purpose halls in primary schools with no music accommodation) airborne sound insulation values are at least 5dB higher, and impact sound insulation values that are at least 5dB lower, than the performance standards required by BB 93.

   Refurbishments: All relevant spaces achieve reverberation times compliant with table 1.5 of BB93.

4. Pre-completion acoustic testing is carried out by a suitably qualified acoustician as described in BB93 to ensure that all relevant spaces (as built) achieve the required performance standards. Any remedial works required in spaces that do not meet the standards (as identified via testing) are completed prior to handover and occupation.

Pre-schools, schools and sixth form colleges only

Third credit (or second credit for Pre-school building types)

5. For roofs with a mass per unit area less than 150kg/m^2 (lightweight roofs) or heavyweight roofs ($\geq$150kg/m^2) with glazing/rooflights:

   a. Calculations (see compliance note) or measurements demonstrate that the reverberant sound pressure level in the relevant rooms are not more than 20dB$L_{Aeq,\ 30min}$ above the indoor ambient noise level for the equivalent type of room given in Table 1.1 of Building Bulletin 93.

   For heavy weight roofs with a mass per unit area greater than 150kg/m^2 (including those with sedum planting) that do not have any glazing/rooflights, calculations are not required.

Further and Higher Education Colleges only

First credit

1. Indoor ambient noise levels in all non-teaching *unoccupied spaces,* i.e. spaces/rooms not covered in BB93, comply with the good practice levels of BS8233:1999, Tables 5 & 6[59]. Typical, appropriate noise levels are given below, although the following list is not intended to be exhaustive:

    a. ≤40 dB $L_{Aeq,T}$ General spaces (staffrooms, restrooms)
    b. ≤40dB $L_{Aeq,T}$ in single occupancy offices
    c. 40-50dB $L_{Aeq,T}$ in multiple occupancy offices
    d. ≤50 dB $L_{Aeq,T}$ in catering kitchens
    e. 40-55dB $L_{Aeq,T}$ in restaurant areas
    f. ≤45 dB $L_{Aeq,T}$ in informal café/canteen areas
    g. ≤55 dB $L_{Aeq,T}$ in manual workshops
    h. ≤ 35 dB $L_{Aeq,T}$ consulting/treatment rooms
    i. ≤ 30 dB $L_{Aeq,T}$ in sound recording studios
    j. 40-45dB $L_{Aeq,T}$ in bars

    In addition to the above, any rooms/spaces used for medical purposes i.e. treatment, should be designed to meet airborne and impact sound insulation criteria in accordance with Health Technical Memorandum 08-01[58].

2. All rooms/spaces used as teaching or lecture areas (including laboratory areas where present) achieve the Indoor ambient noise level criteria for secondary schools in Section 1 of Building Bulletin 93[57].

3. The sound insulation between *acoustically sensitive rooms* and other *occupied spaces* complies with section 7.6.3.1 of BS8233[59], as follows:

    a. $D_w + L_{Aeq,T} > 75$
        - D_w is the weighted sound level difference between the two spaces
        - $L_{Aeq,T}$ is the design (or measured) indoor ambient noise level in the space adjacent to the *acoustically sensitive room*.

    The source and receive room sound pressure levels from which D_w is derived must be measured in accordance with BS EN ISO 140-4:1998 and the guidance in Annex B of Approved Document E. Measurements must be based on finished but unfurnished rooms, accounting for any carpets and acoustically absorbent ceilings specified.

3. Pre-completion acoustic testing is carried out by a *suitably qualified acoustician* to ensure that all relevant spaces (as built) achieve the performance standards required, and any required remedial works in spaces that do not meet the standards are completed prior to handover and occupation.

Second credit

5. All areas used for teaching, training and educational purposes (such as classrooms, seminar rooms and lecture theatres) achieve reverberation times compliant with table 1.5 of BB93.

6. Pre-completion acoustic testing is carried out by a *suitably qualified acoustician* to ensure that all relevant spaces (as built) achieve the performance standards required, and any required remedial works in spaces that do not meet the standards are completed prior to handover and occupation.

Compliance Notes	
New Build	There are no additional or different criteria to those outlined above specific to new-build projects.

Refurbishment	There are no additional or different criteria to those outlined above specific to refurbishment projects.
Extensions to existing buildings	There are no additional or different criteria to those outlined above specific to assessments of extensions to existing buildings.
Calculations of rain noise in schools	For the purpose of assessing the third credit in pre-schools, schools and sixth form colleges, the reverberant sound pressure level should be calculated using laboratory test data from measurements conducted in accordance with BS EN ISO 140-18[60] 'Heavy' rain noise excitation.
Schools third credit – rain noise	The rain noise requirement is applicable to both roofing and rooflights. Parts of the building where a heavyweight roof is specified can be excluded from the assessment, e.g. sedum roof or some concrete roofs, where it is known that '*heavy*' rain noise will not lead to indoor ambient noise levels exceeding the above requirements.
BB93 relaxation of requirements for schools in Northern Ireland	The Department for Education Northern Ireland (DENI) issued a note to designers in November 2006 detailing relaxations in compliance with BB93. The relaxations were made to facilitate the particular design requirements for new schools in Northern Ireland (as recommended in the various DENI Building Handbooks). Subsequently, where an assessed school in Northern Ireland has cited the note and applied the relaxation of BB93 requirements, they are not prevented from achieving the available BREEAM credits provided, in all other respects, the building complies with BB93 (and the above BREEAM requirements).
Acoustically sensitive areas	Where the term '*acoustically sensitive rooms'* is referenced in this BREEAM issue, it refers to the following types of space/rooms (where specified) where privacy, and therefore appropriate sound insulation levels, are deemed important: • Cellular offices, meeting/interview rooms • Any other room/space the design team or client deems to be acoustically sensitive.
Unoccupied spaces	Where the term '*unoccupied space'* is referenced in this BREEAM issue, it refers to the nature of the space for the purpose of carrying acoustic calculations or measurements i.e. such measurements must be carried when the space is unoccupied and therefore devoid of sources of noise. Care should be taken to avoid confusing this term with the definition "*occupied space*" (see relevant definitions) as they have two different meanings within the context of this BREEAM issue.
Awarding credits	Each available credit can be awarded independently of the other available credits for this issue e.g. the second credit can be awarded without achieving the first credit.
Measurement procedures	For the assessment of pre-schools, schools and sixth form colleges the measurement procedures outlined in BB93 should be followed. For assessments of further and higher education buildings, the procedures outlined in BB93 can be followed if/where appropriate. Alternatively, the measurement procedures in the Additional Guidance section (below) can be followed. Where the acoustician has felt it necessary to deviate from these procedures, they must give justifiable reasons why they have done so.
Privacy	Where ranges of noise levels are specified where privacy is not deemed by the final occupier to be an issue, it is acceptable to disregard the lower limit of the range and consider the noise levels to be lower or equal to the upper limit of the range.
Reverberation times	Where the reverberation times stated above or in the referenced documents are not appropriate for the type of space/building assessed, the acoustician must confirm why this is the case. In addition the acoustician must set alternative appropriate reverberation times and provide these to demonstrate compliance.

Schedule of Evidence Required

Req.	Design Stage	Post Construction Stage
Pre-schools, schools and sixth form colleges		
1,3,5	A copy of the design plan for each level of the building with each room/area clearly labelled. A copy of the specification clause confirming: • The building will comply, and where relevant exceed the performance standards required by BB93. **OR** A copy of the acousticians calculations confirming: • The specific performances standards achieved for each relevant room/area • The standards comply, and where relevant exceed the levels required by BB93.	Copies of acoustic field test report/results confirming: • The required performance levels have been achieved for each tested room/area of the completed building. • Where relevant, any remedial work/actions required to meet the performance standards. Evidence, such as a formal letter from the acoustician or their test report confirming that they meet BREEAM's definition of a *suitably qualified acoustician*. A letter from the design team or main contractor confirming: • Any and all required remedial works have been carried out in accordance with the acoustician's recommendations.
2&4	A copy of the specification clause or a formal letter from the project team confirming: • A programme of pre-completion acoustic testing by a *suitably qualified acoustician* will be commissioned. • Where rooms/areas do not comply with the required levels, appropriate remedial works will be actioned and completed.	As outlined above.

Further and Higher Education		
1-3	A copy of the design plan for each level of the building with each room/area clearly labelled. A copy of the specification clause or acousticians calculations confirming: • Indoor ambient noise levels in each relevant room/area • Sound insulation levels between each *acoustically sensitive room* and adjacent *occupied areas*. • The standards to which calculations/measurements have complied, or are required to comply with.	Copies of acoustic field test report/results confirming: • The required performance levels have been achieved for each room/area of the completed building. • Where relevant, any remedial work/actions required to meet the performance standards. Evidence, such as a formal letter from the acoustician or their test report confirming that they meet BREEAM's definition of a *suitably qualified acoustician*. A letter from the design team or main contractor confirming: • Any and all required remedial works have been carried out in accordance with the acoustician's recommendations.
4&6	A copy of the specification clause or a formal letter from the project team confirming: • A programme of pre-completion acoustic testing by a *suitably qualified acoustician* will be commissioned. • Where rooms/areas do not comply with the required levels, appropriate remedial works will be actioned and completed.	
5	A copy of the specification clause or acousticians calculations confirming: • The reverberation times in areas *used for speech*. • The standards to which calculations/measurements have complied, or are required to comply with.	As outlined above.

Additional Information

Relevant definitions

Suitably qualified acoustician: Those organisations or individuals having UKAS accreditation or accredited by a European equivalent of UKAS. The definition includes organisations or individuals registered to schemes that are UKAS accredited, or equivalent, to ensure consistency and technical competence in sound testing. At the time of writing the Association of Noise Consultants (ANC) Registration Scheme is in the process of obtaining UKAS accreditation and can be deemed to comply with this requirement until advised otherwise.

Single occupancy offices: cellular office space designed to accommodate one or two desk spaces/workstations (typically no greater than $10m^2$).

Multiple occupancy offices: Office space that is not cellular in nature i.e. it is open-planned, and designed to accommodate more than two desk spaces/workstations.

Occupied space: For the purpose of this BREEAM issue an occupied space is a room or space within the assessed building that is likely to be occupied for 30 minutes or more by a building user (see also description of 'unoccupied space' in the Compliance Notes table above).

Measurement/calculation procedures - Further & Higher Education buildings only

The measurement procedures defined in BB93 can be followed for further or higher education buildings if/where appropriate. Alternatively, the following procedures can be followed:

- Noise from both internal sources (e.g. mechanical ventilation systems, plant noise) and external sources (e.g. traffic noise transmitted via the building façade) should be included, and, where windows are openable as part of the ventilation strategy, these should be assumed to be open for the purposes of calculations and open for measurements.
- Noise from occupants and office equipment (e.g. computers) should not be included in the measurements.
- Measurements should be made in at least four rooms in which noise levels can be expected to be greatest either because they are on the noisiest façade or because they are on a naturally ventilated façade.
- Where different ventilation strategies are used, measurements should be conducted in rooms utilising each strategy. Otherwise, measurements should be made in rooms on the noisiest façade.
- T in $L_{Aeq,T}$ is taken as the duration of the normal working day (typically 8 hours between 09.00 and 17.00).
- Measurements need not be made over a period of 8 hours if a shorter measurement period can be used. In this case, measurements should be made when external noise levels are representative of normal conditions throughout the day.
- Measurement periods less than 30 minutes may give representative values for indoor ambient noise levels and may be utilized where this is the case. However measurement periods shorter than 5 minutes should not be used.
- Measurements should be taken in a minimum of 3 locations in rooms at a height of 1.2 m above the floor level and at least 1 m away from any surface.
- Where relevant, measurement of airborne sound insulation between teaching spaces should be conducted between one in four pairs of adjacent rooms (or teaching spaces).
- Where relevant, measurement of impact sound pressure level should be conducted in one in four teaching spaces (separated from rooms above).

For music rooms it may be possible to aid compliance with the above requirements by positioning and orientating such rooms away from more noise-sensitive areas such as libraries and classrooms.

The above is intended as guidance for undertaking acoustic measurements to demonstrate compliance with the performance requirements in BREEAM. If the acoustician has felt it necessary to deviate from the above procedures, they should provide a justifiable reason for doing so and confirm that the alternative procedures are adequate for demonstrating that the building meets the acoustic performance requirements.

NR curves

Noise assessments based on NR curves are often used by building services consultants to predict internal noise levels due to mechanical ventilation systems. However, the BREEAM requirement uses the indoor ambient noise level, $L_{Aeq,T}$ which includes external noise transmitted via the façade as well as internal noise such as that from mechanical ventilation systems. In the absence of strong low frequency noise, $L_{Aeq,T}$ can be estimated from the NR value using the following formula: $L_{Aeq,T} \approx$ NR + 6 dB. Therefore, if the NR value is known, but not the sound pressure levels in the individual frequency bands, an estimate for the indoor ambient noise level $L_{Aeq,T}$ can still be determined from the NR value for the building services noise. The $L_{Aeq,T}$ for the external noise transmitted via the façade must then be combined with the $L_{Aeq,T}$ for the building services.

Issue ID	Issue Title	No. of credits available	Minimum standards
Hea 14	Office Space	N/A	No

Issue not assessed under this scheme

Issue ID	Issue Title	No. of credits available	Minimum standards
Hea 15	Outdoor Space	N/A	No

Issue not assessed under this scheme.

Issue ID	Issue Title	No. of credits available	Minimum standards
Hea 16	Drinking Water	1	No

Aim

To provide appropriate and available supplies of free, fresh, chilled drinking water to building occupants throughout the day.

Assessment Criteria

The following demonstrates compliance:

Pre-schools, schools, sixth form and Further Education building types only

1. Chilled, mains-fed *point of use water coolers* are provided in locations that are safe, convenient and accessible to all building users throughout the day.

2. One compliant *point of use water cooler* is provided for every 200 *building users*, subject to a minimum of two water coolers being provided for any building with over 200 *building users*.

3. All coolers must be attached to both the wall and the floor to prevent vandalism, and contain security covers to protect all water and electrical connections.

Compliance Notes	
New Build	There are no additional or different criteria to those outlined above specific to new-build projects.
Refurbishment	There are no additional or different criteria to those outlined above specific to refurbishment projects.
Extensions to existing buildings	Where compliant water coolers are provided in an existing building, and the *users* of the new building have access to these facilities, such facilities can be used to demonstrate compliance against the criteria for this BREEAM issue. In such instances however, the users of the existing building must be factored in to the calculation for determining the compliant number of coolers that need to be provided.
Fit Out only	There are no additional or different criteria to those outlined above specific to fit out-only assessments.
Building users	Where the term '*building users'* is referenced in this BREEAM issue, it refers to pupils or students and staff i.e. teachers, lecturers, and support and administration staff.
Safe, convenient and accessible	Suitable locations for water dispensers include open areas and areas under surveillance, such as: • Dining/assembly halls • Classrooms/common rooms • Wide corridors • Indoor social areas • Changing rooms, gymnasia • Admin areas.

Non compliant water dispensers	The following types of water dispensers do not comply with the criteria of this BREEAM issue: • Water fountains as they are difficult to keep in a hygienic condition, do not encourage children to consume adequate fluid intake and are typically not chilled • Ordinary taps fed from the mains supply; these are rarely chilled or bespoke for water dispensation • Bottled water from vending machines or over the counter. The credit cannot be awarded where dispensers are located in toilet areas.
Higher Education building types	This BREEAM issue is not applicable in the assessment of higher education buildings.

Schedule of Evidence Required

Req.	Design Stage	Post Construction Stage
1-3	Marked-up drawings showing: • Location, number and type of compliant water coolers. Project brief or correspondence from the design team confirming: • The actual/predicted number of building users.	Assessor's building/site inspection report and photographic evidence confirming: • Locations and number of the mains-fed water coolers.

Additional Information

Relevant definitions

Point of Use Water Cooler: watercoolers that are plumbed directly into the mains water supply and drainage. The advantage of water coolers is twofold: their appearance is modern and appealing to users and most offer both chilled and ambient temperature water.

Issue ID	Issue Title	No. of credits available	Minimum standards
Hea 17	Specification of Laboratory Fume Cupboards	1	No

Aim

To ensure that laboratory fume cupboards and safety cabinets are designed and specified in accordance with best practice guidance.

Assessment Criteria

The following demonstrates compliance:

1. Where specified/installed, fume cupboards are manufactured and installed in accordance with the following:
    a. Schools and sixth form colleges: Building Bulletin 88 (in addition to the British Standards below, where relevant).
        i. BS EN 14175-[25]: Fume Cupboards, Safety and Performance Requirements
        ii. For Recirculatory filtration fume cupboards: BS 7989[61]
    b. Further Education colleges: In accordance with the above British standards, or for fume cupboards in labs for subjects up to and including A' Level, compliance with Building Bulletin 88 would also be acceptable.
    c. Higher Education: In accordance with the above British standards.

2. Where specified/installed, the discharged velocity from the extract fan stack from a ducted fume cupboard must be ≥10m/s as recommended by BS EN 14175-2.

3. Where specified/installed, microbiological safety cabinets are manufactured and installed in accordance with BS EN 12469[7].

Compliance Notes	
New Build	There are no additional or different criteria to those outlined above specific to new-build projects.
Refurbishment	There are no additional or different criteria to those outlined above specific to refurbishment projects.
Extensions to existing buildings	There are no additional or different criteria to those outlined above specific to the assessment of extensions to existing buildings.
Fit Out Only	There are no additional or different criteria to those outlined above specific to fit out-only assessments.

Requirement 1 for schools and sixth form	For fume cupboards specified/installed for up to and including A' Level subjects, confirmation of the specification and installation in accordance with Building Bulletin 88 will be acceptable for BREEAM compliance. BS7989 and parts of BS14175 may be relevant to some installations; in such cases the person/organisation responsible for producing/installing the lab equipment should be able to confirm if they are relevant given the type of fume cupboard installation.
Discharge velocity	BS EN 14175 Part 2 states that the discharge velocity from fume cupboard extracts should be at least 7m/s but that a figure of 10m/s is preferable to ensure that the discharge will not be trapped in the aerodynamic wake of the stack. Higher discharge velocities may be required, especially in windy locations, but higher rates may cause noise problems.
Building contains no fume cupboards or safety cabinets	Please note that this issue will not be assessed where laboratory space, fume cupboards or safety cabinets are absent from the assessed building. In such instances the BREEAM assessor's spreadsheet tool will filter this issue from the list of applicable credits.

Schedule of Evidence Required

Req.	Design Stage	Post Construction Stage
1-3	A copy of the relevant clause(s) from the specification confirming: • The standards to which fume cupboards and safety cabinets must be manufactured and installed • The fume cupboards' discharge velocity from extract. **OR** A copy of the relevant clause(s) from the specification confirming: • Make and model of cupboard/cabinets to be installed **AND** • Manufacturers'/suppliers' literature confirming compliance with the criteria. **OR** A formal letter from the design team confirming: • The specified fume cupboards and safety cabinets will be manufactured and installed in compliance with the relevant standards. • The required fume cupboard discharge velocity from the extract.	Correspondence from the design team (where it was not confirmed at the design stage) confirming: • The make and model of cupboards/cabinets that have been installed. **AND** A copy of the manufacturers'/suppliers' literature or a letter from these parties confirming: • Their cupboards/cabinets are manufactured and installed in accordance with the relevant standards.

Additional Information

Relevant definitions

Fume cupboard/safety cabinet: A piece of scientific equipment designed to limit a person's exposure to hazardous fumes or biological material. Air is drawn through the enclosure of the cupboard conducting the contaminated air away from the experimental area and those using the equipment.

6.0 Energy

Issue ID	Issue Title	No. of credits available	Minimum standards
Ene 1	Ene 1 Reduction of CO_2 Emissions	15	Yes

Aim

To recognise and encourage buildings that are designed to minimise the CO_2 emissions associated with their operational energy consumption.

Assessment Criteria

The following demonstrates compliance:

1. The number of credits achieved is determined by comparing the building's CO_2 index (EPC Rating), taken from the Energy Performance Certificate (EPC), with the table of benchmarks below:

Table 9 CO_2 index benchmarks and BREEAM credits

	CO_2 Index (EPC Rating)	
BREEAM Credits	New Build	Refurbishment
1	63	100
2	53	87
3	47	74
4	45	61
5	43	50
6	40	47
7	37	44
8	31	41
9	28	36
10	25	31
11	23	28
12	20	25
13	18	22
14	10	18
15	0	15
Exemplar credit 1	<0	≤0
Exemplar credit 2	*True zero carbon building*	

For buildings that are part new-build part refurbishment refer to Compliance Notes.

2. The CO_2 index for the assessed building must be entered in to the relevant box of the *Ene 1 Reduction of CO_2 emissions* calculator.

3. The building has been modelled using a method compliant with the National Calculation Method (NCM) and an Energy Rating and certificate produced using *Approved software* by an *Accredited Energy Assessor*.

Historic Buildings only
In addition to the above an additional 2 credits may be awarded (up to a maximum of 15) for carrying out the following:

1. A specialist study has been undertaken by a heritage conservation specialist, who is a full Member of the Institute of Historic Building Conservation, to investigate the implications of improving building fabric performance whilst minimising the potential negative impacts on both the historic character of the building and the condition of the building fabric.

2. The report makes recommendations for potential improvements to the building fabric in accordance with the guidance given in English Heritage's *Balancing the needs for energy conservation with those of building conservation: an Interim Guidance Note on the application of Part L*[62] and, as a minimum, covers the following issues:

    a. Each element of the following building elements (as a minimum) must be considered and recommendations for improvements made:

        i. Roof
        ii. External/Sheltered walls
        iii. Ground floor
        iv. Upper floors
        v. Windows and external doors
        vi. Junctions between building elements such as between roof and walls.
        vii. Junctions between different parts of the building such as between different ages or methods of construction.

    Where significant improvement cannot be made to an element then the report should state the reason, setting out in detail the conservation and/or building performance issues that have resulted in this recommendation.

    b. The potential for improvements in ventilation, air tightness and moisture control within the building, ensuring that these are considered in balance with that of the welfare of the historic building fabric. In general, tighter building fabric can be balanced with controlled ventilation improvements (passive and mechanical) and the benefits and disadvantages must be set out together with the recommendations.

3. The study must have been carried out at or prior to concept design stage (equivalent to RIBA stage C or earlier).

4. The building design has implemented and accounted for the study's recommended improvements and, in particular, demonstrates:

    - The design strategy chosen is that which has the greatest impact in terms of potential improvements in energy use, whilst minimising the detrimental impacts on the historic building fabric.
    - That any improvements made to the thermal insulation of the building have been specified in accordance with the recommendations of '*Thermal Insulation: avoiding risks*'[63].

Exemplary level criteria
The following outlines the exemplary level criteria to achieve an *innovation credit* for this BREEAM issue:

1. One additional innovation credit can be awarded where evidence provided demonstrates the building is designed to be a *carbon neutral* building as defined by the NCM (i.e. in terms of building services energy demand), as follows:

    a. A new building achieves a CO_2 index **less than** zero on the benchmark scale.
    b. A refurbished building achieves a CO_2 index **equal to or less than** zero on the benchmark scale.

2. Two additional innovation credits can be awarded where evidence provided demonstrates the building is designed to be a *True zero carbon building* (in terms of building services and operational energy demand).

Compliance Notes	
New Build	New buildings should compare their Energy Rating to the New Build benchmark scale.
Refurbishment	Existing buildings that have undergone or are undergoing major refurbishment should compare their Energy Rating to the Refurbishment benchmark scale. This separate scale aims to better recognise and encourage the energy-efficient refurbishment of existing buildings which results in a significant reduction in the energy demand for that building.
Extensions to existing buildings	Where an existing building is being extended (and only the new extension is being assessed) and that extension uses existing building services plant, the energy modelling and CO_2 Index must be based on the building fabric of the new extension and any existing, common, building services plant and new building services plant installed that will service the new extension. The energy modelling does not have to consider the existing building fabric where this will not form part of the scope of the BREEAM assessment. Nor does it have to consider existing building services where they are not supplying services (heating, cooling and/or ventilation) to the new extension being BREEAM assessed.
Part new-build extension part refurbishment	For assessments of buildings that are a mixture of new build and existing building refurbishment a weighted benchmark scale is used. The weighted benchmark scale is determined using the area (m^2) for new build and area (m^2) for refurbishment and the two benchmark scales in Table 9 CO2 index benchmarks and BREEAM credits for new build and refurbishment. If there is a higher proportion of new build to refurbishment then the weighted scale will be biased towards the benchmark scale for new buildings and vice-versa if there is a higher proportion of refurbished element. As the benchmarks are influenced by the split in areas between the new build element and major refurbished element of the assessed building, the benchmarks will change if the new build/refurbishment area totals change. To determine the weighted benchmark scale and number of credits achieved, the assessor must enter the area (m^2) for new build and area (m^2) for refurbishment in to the relevant box of the *Ene 1 Reduction of CO_2 emissions* calculator.

Fit Out Only	An Energy Performance Certificate is not legally required for buildings undergoing an internal refit. For the purposes of BREEAM, however, a building's/unit's CO_2 index is required and therefore the process of determining an Energy Rating must be undertaken by an *accredited assessor* to award any BREEAM credits at this stage of assessment.
First Fit Out	If the Fit-Out Only assessment is a first fit-out of a new building designed after 6th April 2008 to the 2006 Part L Building Regulations then the new-build benchmark scale must be used to determine the number of credits awarded.
Refit	If the Fit Out-only assessment is a refit of an existing building then the refurbishment benchmark scale must be used to determine the number of credits awarded.
Renewable and low carbon Installations	Where included as part of the project and therefore assessed under this BREEAM issue, the installation of low or zero carbon technologies can be used to off-set the assessed building's CO_2 emissions. The LZC technology can be installed *on-site, near-site* where a *private wire arrangement* is in place (see relevant definitions) or *off-site* via *accredited external renewables (*see compliance note below).
Accredited external renewables	For the purpose of this BREEAM issue *accredited external renewables* are renewable energy schemes located off-site, but within the UK, which: • Are accredited renewables (as defined by the Energy Act 2004). These will be Renewable Energy Guarantee of Origin (REGO) certified • Create new installed generation capacity, designed to meet the loads of the building (i.e. not just units of carbon) • Are additional to capacity already required under the Renewables Obligation At the time of writing, BRE Global are not aware of a mechanism for accrediting off-site renewables and therefore any renewable energy schemes that meet the above definition; though some ESCOs may achieve these criteria.
Energy exported to the grid	Any electricity from an *onsite* LZC energy source that is exported to the grid may be included in the calculations as if it were used within the building.
EPC certificates, BREEAM & building use/tenancy arrangement	The legislative criteria for an Energy Performance Certificate vary according to building size, use, services and tenancy arrangement. In some instances an EPC will be required for the whole building, in others an EPC will be required for each individual unit or tenanted area within a building. The scope of a BREEAM assessment typically covers the whole building, regardless of whether that building consists of a number of units to be sub let. Where an EPC is required for each unit, for the purposes of determining the number of BREEAM credits, the CO_2 index is the total of the area-weighted average of the CO_2 index of each individual unit. Where the development contains conditioned common and/or landlord spaces, the area of these spaces, unless otherwise accounted for, should be divided and attributed amongst the separate units. The proportion of common area attributed to each unit must be equivalent to the ratio of each unit's area as a proportion of the total area of all units. All units, heating systems and common areas within the assessed building must be accounted for in the assessment of Ene 1. For further information on the EPC criteria, refer to guidance on the Communities and Local Government Website (see references section).

EPC in Scotland	The approach adopted in Scotland for determining an Energy Rating differs from that used in England, Wales and Northern Ireland. Scotland bases its EPC rating on actual CO_2 emissions, regardless of building type, whereas an EPC certificate for the other UK countries uses a CO_2 Index. Whilst both approaches have their merit, for the purpose of comparing BREEAM-assessed buildings on a 'level playing field' a decision has been taken to adopt one approach – the CO_2 Index. Using the *approved software*, buildings located in Scotland can easily determine their CO_2 Index by changing the '*Building Regulations & EPBD parameters'* in the '*Project details*' tab of the NCM-compliant approved software from '*EPC Scotland*' to '*EPC England*' or '*EPC Wales'* or '*EPC Northern Ireland*'.

Schedule of Evidence Required

Req.	Design Stage	Post Construction Stage
1-3	A copy of the EPC output from the *approved software* for the assessed building at the design stage. The *Accredited Energy Assessor's* name and accreditation number (this information will be on the EPC).	A copy of the final registered *Energy Performance Certificate* from the *approved software* for the constructed building*. For buildings assessed in Scotland, a copy of the EPC Output from the *approved software* demonstrating the building's CO_2 Index. The *accredited energy assessor's* name and accreditation number. *The final rating must account for any changes to the specification during construction; and the measured air leakage rate, ductwork leakage and fan performances (as required by Building Regulations).
Historic buildings only		
1-3	A copy of the heritage conservation specialist's report. A letter from the specialist confirming the qualifications, experience and IHBC status.	The evidence required at this stage of assessment does not differ from that outlined at the design stage of assessment.
4	Marked-up drawings or a specification document demonstrating: • Implementation of the study's recommendations[63] • Compliance with '*Thermal Insulation: avoiding risks'*. **OR** Where a formal letter from the design team confirming the above will be implemented.	'As built' drawings and specification demonstrating: • Implementation of the study's recommendations • Compliance with '*Thermal Insulation: avoiding risks'*. Assessor's building/site inspection and photographic evidence demonstrating: • Examples of the recommendations of the study having been manifested in the actual complete building (as highlighted by the design team during the building inspection).

Additional Information

Relevant definitions

Accredited energy assessor: An individual trained and qualified to use *approved software* and produce EPC ratings for non-domestic buildings who are members of an accredited scheme. A register of non-domestic *accredited energy assessors* can be found here: https://www.ndepcregister.com/

For a full list of approved accreditation schemes for Non-dwelling Energy Assessment's visit www.communities.gov.uk

Approved Software: Software approved by Communities and Local Government to produce Energy Performance Certificates (EPC) for non-domestic buildings and check compliance with building regulations.

Carbon neutral building: Where net carbon dioxide emissions resulting from energy consumed in the operation of the space heating/cooling, hot-water systems, ventilation and internal lighting is zero or better.

The calculation of CO_2 emissions can take account of contributions from *on-site*, *near-site* and *accredited external* renewable/low carbon installations. Off-site renewables that are not accredited cannot be used to meet this definition.

CO_2 Index: The energy performance of a building (for England, Wales and N.I.) is shown on the EPC as a Carbon Dioxide (CO_2) based index. It is this index that is used to determine where the building falls on the A+ to G rating scale and the number of BREEAM credits that can be awarded.

Dynamic Simulation Model (DSM): A software tool that models energy inputs and outputs for different types of building over time. In certain situations, SBEM will not be sophisticated enough to provide an accurate assessment of a building's energy efficiency. In these cases Government-approved proprietary dynamic simulation models may be used. Communities and Local Government provide such approval.

Historic buildings - For the purpose of assessing this BREEAM issue, historic buildings are defined as:

a. Listed buildings
b. Existing buildings situated in conservation areas (where the existing building itself has conservation status and contributes to the status of the conservation area)
c. Existing buildings which are of architectural and historical interest and which are referred to as a material consideration in a local authority's development plan
d. Existing buildings of architectural and historic interest within national parks, areas of outstanding natural beauty, and world heritage sites.

Institute of Historic Building Conservation (IHBC): The Institute of Historic Building Conservation (IHBC) is the professional institute which represents conservation professionals in the public and private sectors in the United Kingdom and Ireland. The IHBC exists to establish the highest standards of conservation practice to support the effective protection and enhancement of the historic environment. Full Membership of the IHBC is open to all whose principal skill, expertise, training and employment is in providing specialist advice for the conservation of the historic environment. Full Members are normally expected to demonstrate skills and experience under all of the IHBC's eight Areas of Competence.

Energy Performance Certificate: A certificate that confirms the energy rating of the building from A to G, where A is the most efficient and G is the least efficient. The better the rating, the more energy-efficient the building is, and the lower the fuel bills are likely to be. The energy performance of the building is shown as a Carbon Dioxide (CO2) based index. EPCs are generated using *approved software* by *accredited energy assessors*.

Non-Domestic Energy Performance Certificate Register: A register of *accredited energy assessors* and *Energy Performance Certificates*. Using the certificate reference number the validity of the EPC rating for a constructed building can be confirmed.

Near-site LZC: renewable energy generated near to the site that is provided for all or part of the community, including the assessed building, e.g. decentralised energy generation linked to a community heat network or renewable connected via private wire.

On-site LZC: renewable energy generated on the site of the assessed development.

Private wire arrangement: Where used in the context of BREEAM for low or zero carbon technology installations, a private wire arrangement is where any electricity generated on or in the vicinity of the site is fed directly to the building being assessed, by dedicated power supplies. If electricity is generated which is surplus to the instantaneous demand of the building this electricity may be fed back to the National Grid. The carbon benefit associated with any electricity fed into the grid in this manner can only be allocated against an individual installation or building. In cases where a building is supplied by a communal installation, no carbon benefit can be allocated to buildings which are not connected to the communal installation.

Simplified Building Energy Model (SBEM): SBEM is a computer program that provides an analysis of a building's energy consumption. The SBEM tool is designed to cover buildings that are not dwellings. It has been adopted by government as part of the UK national methodology for calculation of the energy performance of buildings. For more information visit: www.ncm.bre.co.uk/.

True zero carbon building: Where net carbon dioxide emissions resulting from energy consumed in the operation of the space heating/cooling, hot-water systems, ventilation, internal lighting AND process related energy consumption is zero or better.

The calculation of CO_2 emissions can take account of contributions from *on-site*, *near-site* and *accredited external* renewable/low carbon installations. Off-site renewables that are not accredited cannot be used to meet this definition.

Issue ID	Issue Title	No. of credits available	Minimum standards
Ene 2	Sub-metering of Substantial Energy Uses	1	Yes

Aim

To recognise and encourage the installation of energy sub-metering that facilitates the monitoring of in-use energy consumption.

Assessment Criteria

The following demonstrates compliance:

1. Separate *accessible energy sub-meters*, labelled with the end energy consuming use, are provided for the following systems (where present):

    a. Space Heating
    b. Domestic Hot Water
    c. Humidification
    d. Cooling
    e. Fans (major)
    f. Lighting
    g. Small Power (lighting and small power can be on the same sub-meter where supplies are taken at each floor/department).
    h. Other major energy-consuming items where appropriate (see Compliance Notes).

2. All energy sub-meters have a pulsed output to enable future connection to a Building Management System (BMS) for the monitoring of energy consumption.

Compliance Notes	
New Build	There are no additional or different criteria to those outlined above specific to new-build projects.
Refurbishment	There are no additional or different criteria to those outlined above specific to refurbishment projects.
Extensions to existing buildings	Where an existing building is being extended and it has existing building services plant and systems that will be common to both the new extension and existing building, the criteria for energy metering cover the entire building.
Fit Out Only	Where the assessment stakeholder is a tenant within a landlord-owned/operated development with central plant provision, then the central plant must be assessed against the criteria of this issue. This is in addition to the provision of sub-metering of any other substantial uses within the tenant's space that are independent of other tenant units and common areas.
Lighting & small power	Due to traditional distribution methods, it can be difficult to cost-effectively separate lighting and small power. It is acceptable, within a single floor, for lighting and small power to be combined for metering purposes, provided that sub-metering is provided for each floor plate.

Other major energy-consuming items	Other major energy-consuming items, depending on the building type, might include, for example, plant used for swimming or hydrotherapy pools, kitchen plant, cold storage plant, laboratory plant, sterile services equipment, transportation systems (e.g. lifts & escalators) drama studios and theatres with large lighting rigs. See also CIBSE TM39: *Building Energy Metering*[64]
Modular boiler systems	Where the building uses a modular system and the rated input power of the lead boiler is less than the figure in Table 10 Size of plant for which separate metering would be required(Additional Information), but greater than 10kW (see Additional Information), sub-metering of the lead boiler is still required to comply with the criteria of this issue.
Accessible meters	The energy meters must be located in an area of the building that allows for easy access to facilitate regular monitoring and readings by the buildings staff and facilities manager. Typically this will be the plant room, main distribution room or control room (where BMS is installed).

Schedule of Evidence Required

Req.	Design Stage	Post Construction Stage
All	Specification document or technical drawings confirming: • Energy-consuming systems and their rated outputs • Metering arrangements for each system, type and location of meter specified. • If applicable, scope of BMS and its energy-monitoring capability.	Assessor's building/site inspection and photographic evidence confirming: • Location and labelling/function of the individual sub-meters or BMS.

Additional Information

Relevant definitions

BMS: Building (energy) Management System is a central computer controlling, monitoring and optimising building services and systems such as heating, air-conditioning, lighting and security.

Common areas: Developments that have several tenant units, particularly large retail developments, may also share common facilities and access that is not owned or controlled by any one individual tenant, but used by all. Common areas are typically managed and maintained by the development's owner, i.e. landlord or their managing agent. Examples of common areas include an atrium, external areas e.g. parking, stairwells and main entrance foyers/reception.

Table 10[65] Size of plant for which separate metering would be required

Plant Item	Rated input power (kW)
Boiler installation comprising one or more boilers or CHP plant feeding a common distribution circuit	50
Chiller installations comprising one or more chiller units feeding a common distribution circuit	20
Electric humidifiers	10
Motor control centres providing power to fans and pumps	10

Final electrical distribution boards	50

Detailed guidance on how to develop an appropriate metering strategy for the energy criteria of a new building is available in CIBSE TM39 Building Energy Metering[64] and General Information Leaflet 65: *Metering energy use in new non-domestic buildings*[66].

Issue ID	Issue Title	No. of credits available	Minimum standards
Ene 3	Sub-metering of High Energy Load and Tenancy Areas	1	No

Aim

To recognise and encourage the installation of energy sub-metering that facilitates the monitoring of in-use energy consumption by tenant or end user.

Assessment Criteria

The following demonstrates compliance:

Secondary schools, sixth form and further and higher education colleges only

1. Provision of *accessible* sub-meters covering the *energy supply* to all tenanted, or in the case of single occupancy buildings, *relevant function areas or departments* within the building/unit.

2. The meters are labelled with the end energy consuming use.

Compliance Notes	
New Build	There are no additional or different criteria to those outlined above specific to new-build projects.
Refurbishment	There are no additional or different criteria to those outlined above specific to refurbishment projects.
Extensions to existing buildings	There are no additional or different criteria to those outlined above specific to the assessment of extensions to existing buildings.
Fit Out Only	There are no additional or different criteria to those outlined above specific to Fit Out-Only assessments.
Schools	This issue is applicable to secondary schools. It is **not** applicable to pre-school and primary school buildings/developments.
Relevant function areas / departments	This list is not exclusive and where other high-energy consuming areas/departments exist these should also be metered: • Kitchens (excluding small staff kitchens and food technology rooms) • Computer suites • Workshops • Lecture halls • Conference rooms • Drama studio • Swimming pool • Sports hall • Process areas • Laboratories • High containment suites within laboratories • Controlled environment chambers • Animal accommodation areas • Data centres • I.T work and study rooms, including I.T equipped library space and any space with provision of more than 1 PC terminal per 5m^2 Individual sub-metering of standard classrooms/seminar rooms is not required.

Accessible meters	Refer to the Compliance Notes in BREEAM issue Ene 2 for a description.

Schedule of Evidence Required

Req.	Design Stage	Post Construction Stage
1&2	Marked-up drawings and site plan detailing: • Building areas by department/function and/or tenancy • Location of meters. Specification document or technical drawings confirming: • Metering arrangements for each department/function and/or tenancy area • Type of meter specified.	Assessor's building/site inspection and photographic evidence confirming: • Location and function of the individual sub-meters or BMS.

Additional Information

Relevant definitions

BMS: Refer to definitions in BREEAM issue Ene 2.

Energy supply: All types of energy supplied to a building area (department / tenancy / unit) within the boundary of the assessed development; including electricity, gas, heat or other form of energy/fuel which is consumed as a result of the use of and operations within each relevant area.

Issue ID	Issue Title	No. of credits available	Minimum standards
Ene 4	External Lighting	1	No

Aim

To recognise and encourage the specification of energy-efficient light fittings for external areas of the development.

Assessment Criteria

The following demonstrates compliance (where provided):

1. All external light fittings for the building, access ways and pathways have a luminous efficacy of at least 50 lamp lumens/circuit Watt when the lamp has a colour rendering index (Ra) greater than or equal to 60. **OR** 60 lamp Lumens / circuit Watt when the lamp has a colour rendering index (Ra) less than 60.

2. All external light fittings to car parking areas, associated roads and floodlighting has a luminous efficacy of at least 70 lamp lumens/circuit Watt when the lamp has a colour rendering index (Ra) greater than or equal to 60. **OR** 80 lamp Lumens / circuit Watts when the lamp has a colour rendering index (Ra) less than 60.

3. All external light fittings for signs and uplighting have a luminous efficacy of at least 60 lamp lumens/circuit Watt when the lamp wattage is greater than or equal to 25W. **OR** 50 lamp lumens/circuit Watt when the lamp wattage is less than 25W.

4. External light fittings are controlled through a time switch, or daylight sensor, to prevent operation during daylight hours. Daylight sensor override on a manually switched lighting circuit is acceptable.

Compliance Notes	
New Build	There are no additional or different criteria to those outlined above specific to new-build projects.
Refurbishment	There are no additional or different criteria to those outlined above specific to refurbishment projects.
Extensions to existing buildings	Refer to the guidance below for single building assessments on large existing developments/campuses.
Single building assessments on larger developments/ campuses	Where the building being assessed forms part of larger development (or is an extension to an existing building) containing common areas and other buildings, the scope of the external lighting criteria apply only to external new and existing lighting within the *construction zone* of the assessed building.
Fit Out Only	There are no additional or different criteria to those outlined above specific to fit out-only assessments.
No external lighting specified	Where the building is designed to operate without external lighting, including external lighting on the building, signs and at entrances, the credit can be awarded.

Low energy innovative light fittings	Any fitting that consumes less than 5W complies with the criteria provided each individual fitting is a direct replacement for an alternative, individual BREEAM-compliant fitting and provides an equivalent amount of light for the necessary task. The assessor must ensure that several low watt fittings are not being specified in place of one higher watt but overall more energy-efficient fitting. This compliance note is to allow for the specification of innovative low energy light sources, such as LEDs.
Decorative and floodlighting	Decorative lighting and floodlighting must not be exempt from the assessment criteria although temporary lighting such as theatrical, stage or local display installations, where specified, may be excluded.

Schedule of Evidence Required

Req.	Design Stage	Post Construction Stage
1-4	Marked-up site plan and building elevations showing: • Location and purpose of all external lighting fittings. Lighting specification or lighting designer's calculations confirming: • Lamp lumens/circuit watt for each type of fitting as well as the colour rendering index Ra (where appropriate) • External lighting control strategy..	As design stage, but 'as built' documentation. **AND** Assessor's building/site inspection and photographic evidence confirming: • External lighting controls. Manufacturers' literature confirming: • Technical spec for the installed external light fittings.

Additional Information

Relevant definitions

Colour rendering index (Ra): A measure, between 0 and 100, of the ability of a lamp to reproduce the colour of objects in comparison to their aspect under a natural or reference source of light. An incandescent source has a Ra of 100 and a low pressure sodium source a Ra of 0 (see below for further information on colour rendering).

Construction zone: For the purpose of this issue the construction zone is defined as the site which is being developed for the BREEAM-assessed building and its external site areas i.e. the scope of the new works.

Daylight Sensors: A type of sensor that detects daylight and switches lighting on at dusk and off at dawn.

Luminous efficacy in lamp Lumens per circuit Watt: The ratio between the luminous flux produced by a lamp (in Lumens) and the total power consumed by both the lamp and its associated control gear (in Watts).

Time switch: A switch with an inbuilt clock which will allow lighting to be switched on and off at programmed times.

Colour Rendering
At night time, the sensitivity of the eye is shifted towards the blue region of the visual spectrum. As a result, lamps with poor colour rendering index, such as some sodium lamps that emit
light between the yellow and red region of the visual spectrum, require more luminous output to light an object with the same level of brightness than a source with better colour rendering index. Sources with a poor colour rendering index also make the differentiation of coloured objects more difficult for

individuals.

In BS 5489-1:2003[67] Code of practice for the design of road lighting - Part 1: Lighting of roads and public amenity areas, this is acknowledged by allowing a relaxation of the lighting levels (illuminance levels) required when the source specified has a colour rendering index Ra greater than or equal to 60.

The colour rendering index requirement means compliance with this issue using sources of light with a poor colour rendering index is harder to achieve than those with an index greater than or equal to 60. Other benefits of using sources with an index greater than 60 include an increased feeling of safety for individuals, making recognition of spaces and other individuals easier. In areas where CCTV is used, the colour rendering index of lighting sources is critical; an Ra value of at least 80 is recommended (but not required by BREEAM).

Issue ID	Issue Title	No. of credits available	Minimum standards
Ene 5	Low or Zero Carbon Technologies	3	Yes

Aim

To reduce carbon emissions and atmospheric pollution by encouraging local energy generation from renewable sources to supply a significant proportion of the energy demand.

Assessment Criteria

The following demonstrates compliance:

First credit

1. A feasibility study has been carried out by an *energy specialist* (see Compliance Notes) to establish the most appropriate local (on-site or near-site) LZC energy source for the building/development. This study covers as a minimum:

    a. Energy generated from LZC energy source per year
    b. Payback
    c. Land use
    d. Local planning criteria
    e. Noise
    f. Feasibility of exporting heat/electricity from the system
    g. Life cycle cost/lifecycle impact of the potential specification in terms of carbon emissions
    h. Any available grants
    i. All technologies appropriate to the site and energy demand of the development.
    j. Reasons for excluding other technologies.

2. A local LZC energy technology has been specified for the building/development in line with the recommendations of the above feasibility study.

3. The feasibility study has been carried out at RIBA stage C (concept design) or equivalent procurement stage.

OR

4. The organisation that occupies the building has in place a contract with an energy supplier to provide electricity for the assessed building/development from a 100% renewable energy source. This supply must be delivered by an *accredited external renewable* source. The contract must be valid for a minimum of 3 years from the date the assessed building becomes occupied.

Second credit

1. The first credit for a feasibility study must be achieved.

2. A local LZC energy technology has been installed in line with the recommendations of the above feasibility study and this method of supply results in a 10% reduction in the building's CO_2 emissions.

3. Figures used for calculations of the percentage carbon reduction provided by LZC technology are based on the output from *approved energy modelling software*.

Third credit

1. The first credit for a feasibility study must be achieved.

2. A local LZC energy technology has been installed in line with the recommendations of the above feasibility study and this method of supply results in a 15% reduction in the building's CO_2 emissions.

3. Figures used for calculations of the percentage carbon reduction provided by LZC technology are based on the output from *approved energy modelling software*.

Exemplary level criteria
The following outlines the exemplary level criteria to achieve an *innovation credit* for this BREEAM issue.

1. The first credit for a feasibility study must be achieved.

2. A local LZC energy technology has been installed in line with the recommendations of the above feasibility study and this method of supply results in a 20% reduction in the building's CO_2 emissions.

3. Figures used for calculations of the percentage carbon production provided by LZC technology are based on the output from *approved energy modelling software*.

Buildings complying with the exemplary level criteria would therefore achieve four credits for this issue.

Compliance Notes	
New Build	There are no additional or different criteria to those outlined above specific to new-build projects.
Refurbishment	There are no additional or different criteria to those outlined above specific to refurbishment projects.
Extensions to existing buildings	There are no additional or different criteria to those outlined above specific to the assessment of extensions to existing buildings.
Fit Out Only	Existing installed LZC technologies can be used to assess compliance with this BREEAM issue. In circumstances where the percentage total building energy demand requirement is met by such existing systems, the credit(s) can be awarded without the need for a feasibility study.
Feasibility study	When undertaking a feasibility study at a later stage than *outline proposals*, an additional element will need to be included in the report to highlight the local LZC energy sources which have been discounted due to the constraints placed on the project by the late consideration, and the reason for their omission. If the feasibility study discounts all local LZC as unfeasible due to the late stage in the project that the study was commissioned, then the credit for the feasibility study must be withheld. If the feasibility was commissioned at the *outline proposals* stage or earlier and in the unlikely event the study concludes that the specification of any local LZC technology is unfeasible, the first credit can still be awarded. Subsequent credits for installing LZC technology that meets a percentage of building energy demand will not be achievable.

List of recognised LZC technologies	Technologies recognised by the Department for Business Enterprise and Regulatory Reform (BERR) Low Carbon Buildings Programme (LCBP) may be considered as part of a low or zero carbon emissions solution. The following list details the technologies recognised by the BERR, LCBP at the time of going to print: **Solar** • Solar hot water • Photovoltaics **Water** • Small scale hydro power • Tidal power • Wave power **Wind** • Wind turbines **Biomass** • Biomass single room heaters/stoves • Biomass boilers • Biomass community heating schemes **Combined Heat and Power (CHP) for use with the following fuels:** • Biomass • Natural gas • Sewerage gas and other biogases CHP systems must meet the threshold criteria for good quality CHP as set by DEFRA's CHPQA programme[68] **Community heating**, including utilising waste heat from processes such as large scale power generation where the majority of heating comes from waste heat (see also Compliance Notes below). **Heat Pumps** • Ground source heat pumps • Water source heat pumps • Geothermal heating systems • Air source heat pumps For heat pumps to comply, the heat source (ground or water) must be from a renewable source, for example soil, outside air, ground water, or a river. **Other** • Fuel cells using hydrogen generated from any of the above 'renewable' sources The list above is not a definitive list of technologies compliant with BREEAM, but a list of those technologies that may be considered to comply. If the assessor has a justified reason to doubt the low or zero carbon credentials/feasibility of the above technologies, where specified for a development they are assessing, they can justifiably withhold the available BREEAM credits.

LZC technology not listed	Other systems may be acceptable as part of a LZC strategy under this issue but are not inherently considered as LZC technologies. Acceptability will be dependent on the nature of the system proposed. The BREEAM Assessor must confirm acceptability with BRE if in doubt.
Waste heat from a building related operational process	Waste heat from a process that takes place within the assessed building (or on the assessed site), for the purpose of this BREEAM issue, can be considered as 'Low carbon'. This is on the condition that the generation of the heat from the process is integral to the assessed building.
Waste incineration	Waste heat from an incineration plant can only be considered as a low carbon for the purpose of this BREEAM issue under the following circumstances: 1. All other LZC technologies have been considered and discounted in the feasibility study. **And either** 2. The Local Authority or region in which the incineration plant is located is demonstrably meeting its annual waste reuse/recycling targets and waste management policies. **Or** 3. A near- or onsite facility connected to the building, via a *private wire arrangement*, which demonstrably removes re-usable and recyclable waste material prior to incineration.
Biofuels	Given the current uncertainty over their impact on biodiversity, global food production and green house gas savings, plus the ease of inter-changeability between fossil fuels, BREEAM does not recognise or reward building systems fuelled by *first generation biofuels* manufactured from feedstock's e.g. biofuels manufactured from sugars, seeds, grain, animal fats etc. BREEAM will recognise systems using *second generation biofuels* (see relevant definitions) or biofuels manufactured from biodegradable waste materials e.g. biogas, or locally and sustainably sourced solid biofuels e.g. woodchip, wood pellets.
Community and off-site schemes	'Local' does not have to mean *on-site* and community schemes (near site) can be used as means of demonstrating compliance. As this BREEAM issue seeks to encourage the installation of *on-site* and *near-site* LZC technologies, *accredited external renewables* (accept where stated to achieve one credit) cannot be used to demonstrate compliance with the criteria of this BREEAM issue.
Export to the grid	Any electricity from an *onsite* LZC energy source that is exported to the grid may be included in the calculations as if it were used within the building.
More than one technology	The percentage can be made up from more than one of the above technologies.
Building assessed part of a larger development	Where the building under assessment forms part of a larger development and either a new or existing LZC installation is provided for the whole site, then the amount of LZC energy generation counted for in this issue, and subsequent CO_2 emissions saved, should be proportional to the building's energy demand compared to the total energy demand for the site (see also note below on existing LZC technology).
LZC technology already available on site	For developments where there is an existing LZC energy source that can supply a compliant percentage of energy to the assessed building, a feasibility study will still have to be carried out to demonstrate that the existing technology is the most appropriate for the assessed building/development. The study should seek to identify any other options to supply a higher proportion of the building's energy demand in addition to that supplied by the existing source.
Calculation of the CO_2 emissions saved	When calculating the energy contribution and CO_2 emissions saved from the LZC installation the following rules should be applied: • The net yield of the LZC installation(s) must be used (i.e. subtract any CO_2 related to the energy used by the LZC technology itself such as pumps, inverters, controllers, etc).

	• The percentage CO_2 savings should be calculated using the following assumptions: o Renewable heat energy is displacing gas where the location for the building would practically have access to a gas connection. Where there is no access to a gas connection assume oil is being displaced.* o Renewable electrical energy is displacing grid electricity at the national CO_2 conversion rate. * The design team is required to provide the assessor with sufficient justification that gas is not available.
Process-related energy	For the purpose of assessing this BREEAM issue, energy and subsequent CO_2 emissions from process-related activities can be excluded from the total when calculating the percentage reduction in CO_2 emissions. For example energy required for cold storage, catering facilities and laundry equipment can be excluded. Display lighting energy demand, where specified, must not be excluded.

Schedule of Evidence Required

Req.	Design Stage	Post Construction Stage
First Credit		
1&3	A copy of the feasibility study report. Letter from the energy specialist confirming: • Compliance with the definition of an energy specialist • The timing of the feasibility report within the plan of works.	Assessor's building/site inspection (or "as built" drawings) and photographic evidence confirming: • Installation of LZC technology.
2	Marked-up design plan or specification confirming: • Proposed installation of LZC energy technology. Manufacturer's technical data and details or calculations stating the carbon savings as a result of the installed LZC technology.	
4	Where an offsite supply is being used as a method of compliance, supplier's documentation confirming: • Name and details of supplier • Details of the source of supply. A copy of the contract or other formal documentation confirming the length of contract to supply 100% renewable energy.	As design stage evidence.
Second, Third & Exemplary Level Credit		
1	Evidence (as outlined above) confirming compliance with the first credit.	Evidence (as outlined above) confirming compliance with the first credit.
2&3	A copy of the report produced by the *approved energy modelling software* illustrating;	Where there have been changes to the proposed design or LZC technology specification, a copy of the 'as built' report

	• The name of the approved software used to carry out the modelling • Confirmation of the expertise and experience of the individual carrying out the modelling • Total CO_2 emissions for the assessed building (without LZC energy technology). **AND** Calculations/outputs from the manufacturer, supplier, engineer or *approved software* confirming: • Total carbon savings as a result of the installed LZC technology.	produced by the Building Regulations-compliant energy model confirming the same data as outlined at the design stage.

Additional Information

Relevant definitions

Accredited External Renewables: Please refer to the Compliance Notes in BREEAM issue Ene 1.

Approved Energy Modelling Software: Please refer to the relevant definitions in BREEAM issue Ene 1.

Energy Specialist: An individual who has acquired substantial expertise or a recognised qualification for undertaking assessments, designs and installations of low or zero carbon solutions in the commercial buildings sector; and is not professionally connected to a single low or zero carbon technology or manufacturer.

First and second generation biofuels: first generation biofuels are biofuels made from sugar, starch, vegetable oil, or animal fats using conventional technology. Second generation biofuels are biofuels from lignocellulosic biomass feedstock using advanced technical processes[69] Common first generation biofuels include vegetable oil, biodiesel and bioalchols.

Feasibility credit objective: The objective of the feasibility study is to make sure that LZC energy technologies installed on a particular site are the most appropriate for this site and ensure maximum reduction of pollutants to the atmosphere. Therefore, no credit can be awarded if a feasibility study has not been undertaken.

Life Cycle Costs: the total cost of a building or its parts throughout its life, including the costs of planning, design, acquisition, operations, maintenance and disposal, less any residual value, in terms of carbon emissions.

Life cycle impact: this is the requirement to look at the carbon balance of each technology over its whole life. Encouraging people to not just the savings or emissions over its operational life but also the savings or emissions over the whole life of the technology (from 'cradle to grave'), therefore reflecting the fact that different technologies have different life spans.

Near-site LZC: Please refer to the relevant definitions in BREEAM issue Ene 1.

On-site renewable: Please refer to the relevant definitions in BREEAM issue Ene 1.

Private wire arrangement: Please refer to the relevant definitions in BREEAM issue Ene 1.

Payback period: the period of time needed for a financial return on an investment to equal the sum of the original investment.

Issue ID	Issue Title	No. of credits available	Minimum standards
Ene 6	Building fabric performance and avoidance of air infiltration	1	No

Aim

To recognise and encourage measures taken to minimise heat loss and air infiltration through the building fabric.

Assessment Criteria

The following demonstrates compliance:

Higher Education building types only

Design measures

Where all of the measures below have been specified/installed to minimise heat loss and air infiltration through the building fabric from treated/conditioned spaces:

1. Installation of personnel door(s) between internal and external areas within proximity of any adjacent openings for goods delivery access; **AND** a draught lobby between office areas (where present) and the external building access.

2. Delivery loading/unloading areas and operational and/or storage areas are partitioned (see also compliance note on relevancy of design measures).

3. Where present all goods/personnel access, vents in the roof and backdraught dampers on extract fans are draught sealed.

4. Loading/unloading bay doors insulated to 0.6 W/m^2K.

5. Plastic strip curtains are specified between internal delivery areas and other internal warehouse storage or operational areas (where there is no other draught sealing or doors). The strip curtains should have a partial overlap.

6. Either of the following are specified on the external goods doors/vehicle delivery bays:

    a. Plastic strip curtains (with a partial overlap)
    b. Air curtains (not door heaters) covering the entire width of the opening
    c. Pneumatic dock seals mounted on all vehicle delivery bays.

7. Rapid rise loading/unloading bay doors with at least 1.0 m/sec closing speed or less than 5 secs closing time between fully opened and fully closed are specified/installed.

As built performance measures

8. In addition to the above and Building Regulations requirement for air tightness testing, a comprehensive thermographic inspection of the building fabric (once construction is complete) has been or will be undertaken to confirm the following:

    a. Continuity of insulation in accordance with the construction drawings
    b. Avoidance of excessive thermal bridging
    c. No air leakage paths through the fabric (except through intentional openings)

9. The inspection has been, or will be, carried out in accordance with BS EN 13187 *Qualitative detection of thermal irregularities in building envelopes. Infrared method*[70] and CIBSE TM23:2000 *Testing Buildings for Air Leakage*[71].

10. Any defects identified via the inspection are rectified and the building re-inspected to confirm it complies with the criteria of point 8.

11. Plus, where integral cold storage facilities are present, these have been tested and commissioned in accordance with the cold storage criteria of BREEAM issue Man 1.

Compliance Notes	
New Build	There are no additional or different criteria to those outlined above specific to new-build projects.
Refurbishment	There are no additional or different criteria to those outlined above specific to refurbishment projects.
Extensions to existing buildings	There are no additional or different criteria to those outlined above specific to the assessment of extensions to existing buildings.
Fit Out Only	There are no additional or different criteria to those outlined above specific to fit out-only assessments.
Scope of the thermographic survey	The thermographic survey must ensure that all exterior walls to treated areas and all walls separating treated and untreated spaces will be tested.
Where some design measures are not relevant	If some of the design measures are not relevant, e.g. partitioning between delivery and storage areas may not be practical because of operational reasons or the building/unit is too small; the assessor may omit them from the assessment. In such instances the design team must provide the assessor with an adequate statement of justification as to why this is the case. The assessor must use their discretion in determining the validity of the case and reference any justification and design team statement in the formal BREEAM report.
No heated or air conditioned areas	Where the scope of the building specification covers fitted-out elements and the building is designed to be untreated then the requirement to comply with the 'as built' performance measures can be omitted. The design measures are still applicable for future-proofing i.e. in the event that the building at some point has heating and/or air conditioning plant installed.
Scope of the issue	This issue is applicable only for assessments of buildings that have a warehouse storage/operational area and/or dedicated vehicle delivery bays/access. Where this is not the case the issue will be filtered from the list of applicable issues by the BREEAM assessor's spreadsheet tool. Where the issue is applicable, the 'as built' performance measures i.e. the requirement for a thermographic survey applies to the whole building, not just the warehouse/delivery area (to ensure completeness of the measures).

Schools and further education buildings	This issue is not assessed for pre-schools, schools, sixth form and further educational buildings.
Synergy with Ene 1	It should be recognised that whilst there is only one credit available for this BREEAM issue, the benefit of installing the above measures will also be recognised in BREEAM issue Ene 1, Reduction of CO_2 emissions. This BREEAM issue is provided in addition to Ene 1 to recognise and encourage specific measures taken to reduce air infiltration to and heat loss from the internal storage, warehousing and delivery areas of the building.

Schedule of Evidence Required

Req.	Design Stage	Post Construction Stage
1-7	A copy of the relevant clauses of the specification or proposed design plan confirming: • Each of the relevant measures incorporated into the design.	Assessor's building/site inspection and photographic evidence confirming compliance.
8-10	A copy of the specification clause(s) confirming: • A requirement to commission a thermographic study • The standards/method to which the survey will be carried out • A requirement to rectify any defects and re-inspect to confirm performance.	A copy of the survey report or certificate confirming either: • No consequential defects in construction details or continuity of insulation. **OR** • All consequential defects remedied following re-inspection.
11	Evidence as outlined under BREEAM issue Man 1 for the relevant requirement.	Evidence as outlined under BREEAM issue M1 for the relevant requirement.

Additional Information

Relevant definitions

Thermographic inspection: A method of producing images of a building using thermal radiation. The images help to identify areas of the building fabric with a higher (or lower in the case of internal fabric) than expected surface temperatures, thus indicating heat loss from, or air infiltration to, the building and therefore highlighting construction defects.

Air curtain: A fan heater that directs a curtain of warm air downwards over an opening which prevents the transfer of heat through the opening. Air curtains help to manage and minimise heat loss from the building when it is necessary to open external doors or access a cold storage enclosure.

Air permeability: The Building Regulations Approved Document L2A defines air permeability as the "*physical property used to measure air tightness of the building fabric*" (refer to the Approved Document for a fuller definition).

Pneumatic dock seals: Also referred to as inflatable shelters, are structures that surround the top and sides of a vehicle loading dock forming a seal between the building and delivery vehicle and therefore minimising heat loss from the building.

Treated: A term to describe an area of the building that is heated and/or mechanically cooled by plant integral to the building.

Issue ID	Issue Title	No. of credits available	Minimum standards
Ene 7	Cold Storage	3	No

Aim

To recognise and encourage the installation of energy efficient cold storage systems, therefore reducing operational CO_2 emissions.

Assessment Criteria

The following demonstrates compliance:

Higher Educational buildings only

First credit

1. The following components, where specified as part of the cold storage refrigeration plant/strategy, are on the ECA Energy Technology Product List or an equivalent list:

    - Air cooled condensing units
    - Automatic air purgers
    - Cellar cooling equipment
    - Commercial service cabinets (cold food storage)
    - Curtains, Blinds, Sliding Doors and Covers for Refrigerated Display Cabinets
    - Evaporative condensers
    - Forced air pre-coolers
    - Liquid pressure amplification
    - Refrigerated display cabinets
    - Refrigeration compressors
    - Refrigeration system controls

Second credit

2. Where the cold storage refrigeration plant complies with the following minimum criteria:

    a. Variable speed drives are fitted to the compressors, pumps and fans
    b. Strip curtains are installed on the cold storage opening(s)
    c. Low powered/heat lighting is fitted e.g. fibre optics, LEDs
    d. *Defrost on demand* controls for evaporators are installed
    e. The installed refrigeration plant, controls and monitoring system has been specified in accordance with the guidance outlined in the Food & Drink Industry Refrigeration Efficiency Initiative Guide 2 Purchase of Efficient Refrigeration plant
    f. The plant has been commissioned in compliance with the criteria for cold food storage commissioning outlined in BREEAM Issue Man 1 Commissioning (this does not necessarily require BREEAM Issue M1 to have been awarded).

Third credit

3. Where the plant is capable of **EITHER** of the following free cooling/heating strategies:

    - Thermal storage during periods of low load to provide additional cooling during periods of peak cooling load **OR**
    - Heat recovery of the waste heat to meet in part or full space heating and/or hot water criteria for the assessed building or other local demand e.g. air curtain above the cold storage enclosure entrance.

Compliance Notes	
New Build	There are no additional or different criteria to those outlined above specific to new-build projects.
Refurbishment	The criteria apply to any new or existing refrigeration plant. If the existing building contains refrigeration plant that will remain, then this plant must meet the criteria in order to achieve the credit.
Extensions to existing buildings	If the assessment comprises of a part new build-extension and part refurbishment and there is existing cold storage plant in the existing building that also serves the new extension, then the compliance note above for refurbishment applies.
Fit Out Only	There are no additional or different criteria to those outlined above specific to fit out-only assessments.
Buildings with no integral cold storage system(s)	If the building does not contain cold storage system(s), this issue is not applicable to the assessment. In such instances the BREEAM assessor's spreadsheet tool will filter this issue from the list of applicable credits.
Awarding the credits	Each of the three credits can be awarded independently of each other i.e. it is not a requirement of the second credit that the first credit is achieved, likewise for the third credit.
Heat recovery or thermal storage unfeasible	Where the specification of thermal storage or heat recovery is unfeasible because there will be no low load periods and/or there is no demand for recovered heat, then the third credit can be awarded provided all the criteria of the second credit are met. The design team must justify why there are no feasible opportunities for heat recovery, free cooling or thermal storage.

Schedule of Evidence Required

Req.	Design Stage	Post Construction Stage
1	A copy of the relevant clause of the specification requiring the specific undertaking. **OR** A letter from the manufacturer/supplier or copies of their technical literature confirming the specific components are on the ECA list or compliant with ECA eligibility criteria. **OR** A print out of the ETPL listing the specific products.	The evidence required at this stage is the same as that outlined at the design stage.

2a-e & 3	A copy of the relevant clause of the specification confirming: • Cold storage plant and enclosure criteria. **AND/OR** A letter from the manufacturer/supplier or copies of their technical literature confirming compliance.	The evidence required at this stage is the same as that outlined at the design stage.
2f	Evidence as outlined under BREEAM issue Man 1 for the relevant requirement.	Evidence as outlined under BREEAM issue Man 1 for the relevant requirement.

Additional Information

Relevant definitions

Defrost on demand controls for evaporators: A control system that automatically initiates a defrost sequence when an appropriate amount control of ice has built up on the evaporator surface.

ECA Energy Technology Product List (ETPL): The EPTL list is part of the Governments Enhanced Capital Allowance Scheme, a key part of the Government's programme to manage climate change. The Scheme provides a tax incentive to encourage investment in low carbon energy-saving equipment that meets published energy-efficiency criteria. The Energy Technology List (ETL) details the criteria for each type of technology, and lists those products in each category that meet them: www.eca.gov.uk.

Issue ID	Issue Title	No. of credits available	Minimum standards
Ene 8	Lifts	2	No

Aim

To recognise and encourage the specification of energy-efficient transportation systems.

Assessment Criteria

The following demonstrates compliance:

First credit

1. An analysis of transport demand and patterns for the building has been carried out by the design team to determine the optimum number and size of lifts and *counterbalancing ratio* on the basis of anticipated passenger demand.

2. The energy consumption for at least two types of lift or lift strategy 'fit for purpose' has been estimated and the system with the lowest energy consumption specified.

Second credit

3. The first credit is achieved.

4. Of the following energy-efficient features, the three that offer the greatest potential energy saving are specified:

    a. The lifts operate in a stand-by mode during off-peak and idle periods. For example the power side of the lift controller and other auxiliary equipment such as lift car lighting and ventilation fan switch off when the lift is not in motion.
    b. Where lift motors use a drive controller capable of variable-speed, variable-voltage, variable-frequency control of the drive motor.
    c. The lift has a regenerative unit so that energy generated by the lift (due to running up empty and down full) is returned back to the grid or used elsewhere on site.
    d. The lift car uses energy-efficient lighting and display lighting (>60 Lumens/watt or fittings that consume less than 5W e.g. LEDS).

Compliance Notes	
New Build	There are no additional or different criteria to those outlined above specific to new-build projects.
Refurbishment	There are no additional or different criteria to those outlined above specific to refurbishment projects.
Extensions to existing buildings	There are no additional or different criteria to those outlined above specific to the assessment of extensions to existing buildings.
Fit Out Only	There are no additional or different criteria to those outlined above specific to fit out-only assessments.

Counter balancing ratio requirement	Lifts will have a specified maximum load and as such the counterbalancing ratio will be set accordingly (generally the counterbalance ratio used is 50%). Provided the type and number of lifts specified, and therefore maximum lift load, is based on an appropriate analysis of transport/lift demand for the building, then the counterbalancing ratio can be considered optimised for the purposes of compliance with BREEAM, without necessarily requiring further deviation of the ratio from that specified.
Exemptions	This BREEAM issue does not apply to buildings that are installing simple platform/wheelchair lift or electronic ramps. If the lift forms an integral part of the building i.e. there is a lift shaft, then it must be assessed.
Building has no lifts	Please note that this issue will not be assessed where a building contains no lifts. In such instances the BREEAM assessor's spreadsheet tool will filter this issue from the list of applicable issues.

Schedule of Evidence Required

Req.	Design Stage	Post Construction Stage
1-2	A copy of the relevant report or documentation detailing the analysis undertaken and findings/recommendations. A copy of the lift specification.	The evidence required at this stage is the same as that outlined at the design stage.
3-4	A copy of the lift specification. **OR** Formal letter from the lift manufacturer/supplier confirming that the lift to be installed on the project meets the relevant criteria for the number of credits sought.	The evidence required at this stage is the same as that outlined at the design stage.

Additional Information

Relevant definitions

Counterbalancing ratio: Lifts use a counterweight to balance the weight of the car plus a proportion of the maximum weight of the passengers; this reduces the size of the drive motor required for the lift. Lowering the counterbalancing ratio means a smaller motor and controlling drive unit are required, thus saving energy.

ISO Draft standard CD25745-1 *Energy performance of lifts, escalators and moving walks – Part 1 Energy and conformance*
It has been estimated that between 5-15% of a building's total energy consumption can be attributed to the operation of lifts and 58% of the energy consumption of lifts is attributable to stand-by mode.

A Working Group of an International Standards Organisation's Technical Committee is developing a draft standard for the Energy performance of lifts, escalators and moving walkways. This standard draft standard outlines proposed procedures to be used when making energy measurements of lifts, escalator and moving walkways.

Issue ID	Issue Title	No. of credits available	Minimum standards
Ene 9	Escalators and travelling walkways	N/A	No

Issue not assessed under this scheme.

Issue ID	Issue Title	No. of credits available	Minimum standards
Ene 10	Free Cooling	1	No

Aim

To reduce the dependency of the building on conventional mechanical refrigeration to provide adequate thermal comfort conditions.

Assessment Criteria

The following demonstrates compliance:

1. Where the building has **ANY** of the following free cooling strategies:

    - Night-time cooling (requires fabric to have a high thermal mass)
    - Ground coupled air cooling
    - Displacement ventilation
    - Ground water cooling
    - Surface water cooling
    - Evaporative cooling, direct or indirect
    - Desiccant dehumidification and evaporative cooling, using waste heat
    - Absorption cooling, using waste heat.
    - The building does not require any form of cooling (i.e. naturally ventilated)

2. The BREEAM issue Hea 10 Thermal Comfort has been achieved.

Compliance Notes	
New Build	There are no additional or different criteria to those outlined above specific to new-build projects.
Refurbishment	There are no additional or different criteria to those outlined above specific to refurbishment projects.
Extensions to existing buildings	There are no additional or different criteria to those outlined above specific to the assessment of extensions to existing buildings.
Information Communication Technology (ICT) classrooms	It is possible for ICT classrooms to be designed to avoid the use of mechanical cooling, as such they are not exempt from the requirements of this issue i.e. if mechanical cooling is used to treat these spaces, it will not be possible to achieve this BREEAM credit.
Requirement to achieve Hea 10	This requirement is set as a condition of awarding the available credits to ensure that the cooling strategy implemented is fit for purpose i.e. it achieves the required internal thermal comfort conditions.

Schedule of Evidence Required

Req.	Design Stage	Post Construction Stage
1	A written description from the building services engineer summarising the 'purpose designed' free cooling strategy. A copy of the results from a dynamic simulation model demonstrating the feasibility of the free cooling strategy.	Assessor's building/site inspection and photographic evidence confirming: • The free cooling technology specified has been installed.
2	Evidence as required for BREEAM issue Hea 10 Thermal Comfort.	Evidence as required for BREEAM issue Hea 10 Thermal Comfort.

Additional Information

Relevant definitions

Dynamic Simulation Model (DSM): Refer to BREEAM issue Ene 1 for a definition.

Free cooling: The ability of the building to provide cooling to the internal occupied areas without the need to rely on energy consuming mechanical chillers.

Issue ID	Issue Title	No. of credits available	Minimum standards
Ene 11	Energy Efficient Fume Cupboards	1	No

Aim

To ensure the energy-efficient design and operation of fume cupboards in laboratory areas.

Assessment Criteria

The following demonstrates compliance:

School, Sixth Form College and Further Education buildings only

1. Recirculatory filtered fume cupboards (as oppose to ducted fume cupboards) are specified as the preferred option for the majority of applications (see compliance notes where ducted fume cupboards are specified/required).

2. The specification of fume cupboards has been carried out in accordance with all relevant guidelines and recommendations contained in;

    a. Schools and sixth form: Building Bulletin 88 and if relevant:

        i. BS7989[61]: (for recirculatory fume cupboards)
        ii. BS EN 14175-2[5] (for ducted fume cupboards, if applicable)

    b. Further Education colleges: In accordance with the above British Standards, or for fume cupboards in labs for subjects up to and including A' Level, compliance with Building Bulletin 88 would also be acceptable.

3. If ducted fume cupboards are specified, the fume cupboards have a face velocity of less than or equal to 0.5 m/s (see compliance notes).

Compliance Notes	
New Build	There are no additional or different criteria to those outlined above specific to new-build projects.
Refurbishment	There are no additional or different criteria to those outlined above specific to refurbishment projects.
Extensions to existing buildings	There are no additional or different criteria to those outlined above specific to the assessment of extensions to existing buildings.
Fit Out Only	There are no additional or different criteria specific to fit-out only assessments.

Requirement 2 for schools and sixth form	For fume cupboards specified/installed for up to and including A' Level subjects, specification and installation in accordance with Building Bulletin 88 will be acceptable for BREEAM compliance. BS7989 and parts of BS14175 may be relevant to some installations, such as those that will use ducted fume cupboards. In these cases the person/organisation responsible for producing/installing the equipment should be able to confirm their relevance given the type of fume cupboard installation.
Higher Education buildings	The energy efficiency of fume cupboards in higher educational buildings is assessed as part of BREEAM issue Ene 19. As such BREEAM issue Ene 11 is not applicable to higher education type buildings.
Filtered vs. Ducted fume cupboards	The performance specifications for fume cupboards used in schools tend to be lower than that required for universities, research institutes and industry. As a result, typically, filtered fume cupboards i.e. those not requiring a ducted system for extract, are the most energy efficient option for schools (up to and including A Level subjects). However, where the project requires ducted fume cupboards for the purpose of meeting the brief, the credit can still be awarded. For example, where the nature of the laboratory space and the type of experiments undertaken require, for health and safety reasons, full extraction from the internal space. This is only likely to be the case for a building undertaking lab based research that exceeds A Level subject areas, i.e. commercial R&D labs and some further or higher education functions/subjects.
Fume cupboard face velocity	CIBSE Guide B2[7/2] recommends a face velocity of 0.5m/s in order to achieve good containment but advises that adequate containment may be achievable at lower face velocities. Due to safety considerations however, in some circumstances meeting the requirement for a face velocity of 0.5 m/s may not be feasible. Where this is not achievable, justification must be provided and the lowest possible face velocity specified for the degree of containment required. For schools, up to and including A Level chemistry, there is unlikely to be a requirement for fume cupboards to exceed a face velocity of 0.5m/s, based on the current curriculum demands.
Building has no fume cupboards	Please note that this issue will not be assessed where a building contains no lab space and fume cupboards. In such instances the BREEAM assessor's spreadsheet tool will filter this issue from the list of applicable Issues.

Schedule of Evidence Required

Req.	Design Stage	Post Construction Stage
1&3	A highlighted copy of the fume cupboard specification or a formal letter from the design team confirming: • Type of fume cupboards to be installed • Design & specification will be in compliance with relevant standard(s). • The fume cupboards face velocity (where applicable).	The evidence required at this stage is the same as that outlined at the design stage. **AND** Formal written confirmation from the design team or relevant contractor that the fume cupboards installed were those specified in the compliant evidence.

Additional Information

Relevant definitions
None.

Issue ID	Issue Title	No. of credits available	Minimum standards
Ene 12	Swimming pool ventilation and heat loss	1	No

Aim

To reduce unnecessary energy consumption of heating and ventilation plant for pool areas.

Assessment Criteria

The following demonstrates compliance:

1. Where automatic or semi-automatic pool covers are fitted to ALL pools, including spa pools and jacuzzi (if relevant) within the building.

2. The covers envelop the entire pool surface when fully extended.

3. Where the air temperature in the pool hall can be controlled so that it is 1˚C above the water temperature.

Compliance Notes	
New Build	There are no additional or different criteria to those outlined above specific to new-build projects.
Refurbishment	There are no additional or different criteria to those outlined above specific to refurbishment projects.
Extensions to existing buildings	There are no additional or different criteria to those outlined above specific to the assessment of extensions to existing buildings.
Fit Out Only	There are no additional or different criteria to those outlined above specific to fit out-only assessments.
Building has no pools	Please note that this issue will not be assessed where a building contains no pools. In such instances the BREEAM assessor's spreadsheet tool will filter this issue from the list of applicable issues.

Schedule of Evidence Required

Req.	Design Stage	Post Construction Stage
1	Design drawing highlighting: • All pools within the building. A copy of the specification confirming: • Requirement and type of pool covers to be installed. If available at the time of assessment, manufacturer's/supplier's details/technical documentation.	Assessor's building/site inspection and photographic evidence confirming: • Installation of compliant covers on all pools. • Heating and ventilation control strategy for the pool areas.

2	A copy of the M&E specification confirming: • Heating and ventilation control strategy for the pool areas.	

Additional Information

Relevant definitions
None.

Issue ID	Issue Title	No. of credits available	Minimum standards
Ene 13	Labelled Lighting Controls	N/A	No

Issue not assessed under this scheme.

Issue ID	Issue Title	No. of credits available	Minimum standards
Ene 14	BMS	N/A	No

Issue not assessed under this scheme.

Issue ID	Issue Title	No. of credits available	Minimum standards
Ene 15	Provision of energy efficient equipment	N/A	No

Issue not assessed under this scheme.

Issue ID	Issue Title	No. of credits available	Minimum standards
Ene 16	CHP Community Energy	N/A	No

Issue not assessed under this scheme.

Issue ID	Issue Title	No. of credits available	Minimum standards
Ene 17	Residential Areas: Energy Consumption	N/A	No

Issue not assessed under this scheme.

Issue ID	Issue Title	No. of credits available	Minimum standards
Ene 18	Drying Space	N/A	No

Issue not assessed under this scheme.

Issue ID	Issue Title	No. of credits available	Minimum standards
Ene 19	Energy Efficient Laboratories	Up to 3 or 5 (dependent on lab area)	No

Aim

To recognise and encourage buildings that are designed to minimise the CO_2 emissions associated with their operational energy consumption in laboratory areas.

Assessment Criteria

The following demonstrates compliance:

Higher Education Buildings only

For buildings with laboratory function areas where the *laboratory area* accounts for at least 25% of the total building floor area

Up to a total of 5 credits can be awarded as follows:

First credit

1. *Laboratories* with fume cupboards and/or other containment devices:

    a. Achieve the credit available for BREEAM issue Hea 17 *Specification of Laboratory Fume Cupboards*
    b. Comply with item a) in Table 11 Best Practice Energy Practices in Laboratories
    c. The measurement of volume flow rates in the exhaust duct (at the boundary of the laboratory) take account of reductions in (inward) fume cupboard leakage
    d. A reduction in air flow does not compromise the health and safety of the building occupants.

    Laboratories without fume cupboards or containment devices refer to the compliance note below.

Up to four additional credits

2. Where fume cupboards and/or other containment devices are specified, the first credit is achieved.

3. Where the laboratory plant and systems are designed, specified and installed in compliance with the items in Table 11 Best Practice Energy Practices in Laboratories (up to an additional four credits for compliance with items b – l).

4. To achieve credit for an item, that chosen item must have a reasonably significant effect on the total energy consumption of the laboratory i.e. 2% reduction or greater.

5. The energy efficient measures taken do not compromise the health and safety of the building occupants.

For buildings with laboratory function areas where the *laboratory area* accounts for at least 10% of the total building floor area

Up to a total of 3 credits can be awarded as follows:

First credit

1. Where laboratories with fume cupboards and/or other containment devices comply with compliance requirement 1 above (laboratories without fume cupboards or containment devices refer to the compliance note below).

Additional credits

2. Where fume cupboards and/or other containment devices are specified, the first credit is achieved.

3. Where the laboratory plant and systems are designed, specified and installed in compliance with the items in Table 11 Best Practice Energy Practices in Laboratories (up to an additional two credits for compliance with items b – l).

4. The actions for any chosen item have a reasonably significant effect on the total energy consumption of the laboratory i.e. 2% reduction or greater.

5. The measures taken do not compromise the health and safety of the building occupants.

Compliance Notes	
New Build	There are no additional or different criteria to those outlined above specific to new-build projects.
Refurbishment	There are no additional or different criteria to those outlined above specific to refurbishment projects.
Extensions to existing buildings	There are no additional or different criteria to those outlined above specific to the assessment of extensions to existing buildings.
Determining the percentage of laboratory area	Laboratories are defined as highly serviced (temperature/ventilation/ humidity/containment controlled) spaces where physical/biological or chemical processing and/or testing is carried out. Such areas will have an inherently high energy requirement. Therefore, for the purpose of assessing this BREEAM issue, the definition of *laboratory areas* excludes any laboratory support areas such as: • Write up/offices • Meeting rooms • Storage • Ancillary and other support areas with lower servicing requirements. Teaching and other laboratories / workshops with a limited amount of fume cupboards or other containment devices and/or no energy intensive process equipment specified are excluded, unless the design team can provide evidence that their consumption is at least 50% higher than a typical office due to the laboratory process related activities. Benchmarks for general offices can be found in Table 1 in CIBSE TM46 *Energy Benchmarks*[73]. Typically, in buildings where 40% of the floor area is laboratory related, only 10% will actually constitute *laboratory areas* as per the BREEAM definition.

Laboratories with or without fume cupboards	In laboratories with fume cupboards/containment devices the first credit must be achieved in order to award any of the additional credits. Where a laboratory has no fume cupboards and/or containment devices the maximum number of credits available is as follows: • Four credits for *laboratory areas* ≥25% of the total building area. OR • Two credits for *laboratory areas* ≥10% and <25% of the total building area. Determined through compliance with items b – l in the Table 11 Best Practice Energy Practices in Laboratories
Awarding the additional credits	When awarding credits using the additional items listed in the table, please note that only whole credits can be awarded. Therefore, for example, where three and half credits are achieved this would need to be rounded down to three credits.
Synergy with BREEAM issue Ene 1	This BREEAM issue has been developed to recognise improvements made to laboratory areas/buildings, as part of the design and procurement of the building, that currently are not recognised through the National Calculation Methodology used to assess and award credits in Ene 1 *Reduction of CO_2 Emissions.*
Pre-Schools, Schools and Further Education buildings	This BREEAM issue is not applicable to assessments of schools, sixth form and further education colleges.

Schedule of Evidence Required

Req.	Design Stage	Post Construction Stage
1&2	Evidence as required for compliance with BREEAM issue Hea 17. Specification clauses, modelling results or manufacturers information confirming: • Specified fume cupboard(s) / containment device(s) containment performance and volume flow rate.	Evidence as required in BREEAM issue Hea17. **AND** 'As built' drawings/specification and assessors building/site inspection and photographic evidence demonstrating: • Installation of compliant fume cupboard(s) / containment device(s) • Installation of the specified complaint technologies/energy reduction measures. **AND** A commissioning report demonstrating that the design containment performance and airflows have been achieved.
3	Specification clauses and/or drawings and/or modelling results demonstrating: • Compliant technologies/energy reduction measures.	
4	Energy modelling results or calculations demonstrating: • Percentage reduction in predicted energy consumption due to implementation of additional items in Table 11 Best Practice Energy Practices in Laboratories.	Evidence as outlined for the design stage of assessment (updated if/where specification has altered since design stage assessment).

5	Confirmation in the form of a letter or email from a relevant design team member confirming: • That the energy efficiency measures specified do not compromise the health and safety of the building occupants.	

Additional Information

Table 11 Best Practice Energy Practices in Laboratories

Item	Category	Item Description	Credits[1]
a.	**Fume cupboard reduced volume flow rates**	An average design air flow rate in the fume cupboards no greater than 0.16 m^3/s per linear metre of sash opening.	1
Additional Items			
b.	**Fan power**	Specification and achievement of best practice fan power figures (as per Table 12 Best Practice Specific Fan Power) for all air handling units, laboratory extract systems, local extract ventilation, containment area extracts (where applicable) and fume cupboard extracts (where applicable).	1
c.	**Fume cupboard volume flow rates (further reduction)**	An average design air flow rate of <0.12 m^3/s per linear metre of sash opening.	½
d.	**Grouping and/or isolation of high filtration/ventilation activities**	Minimisation of room air change rates and overall facility ventilation flows by grouping together or isolating activities and equipment with high filtration or ventilation requirements.	½
e.	**Energy recovery - heat**	Heat recovery from exhaust air (where there is no risk of cross-contamination) or via refrigerant or water cooling systems.	½
f.	**Energy recovery – cooling**	Cooling recovery via exhaust air heat exchangers (where there is no risk of cross-contamination) or via refrigerant or water cooling systems.	½
g.	**Grouping of cooling loads**	Grouping of cooling loads to enable supply efficiencies and thermal transfer.	½
h.	**Free cooling**	Specification of free cooling coils in chillers or dry air coolers related to laboratory-specific activities.	½
i.	**Load responsiveness**	Effective matching of supply with demand through modularity, variable speed drives and pumps, and other mechanisms.	½
j.	**Clean rooms**	Specification of particle monitoring systems, linked to airflow controls.	½
k.	**Diversity**	Achievement of high levels of diversity in central plant sizing and laboratory duct sizing, where compatible with safety.	½

l.	**Room air changes rates**	Reducing air change rates by matching ventilation airflows to environmental needs and demands of containment devices.	½
[1.] Only whole credits can be awarded in BREEAM. Therefore to achieve credit for items c to l (above) the laboratory must comply with at least two of the items.			

Table 12 Best Practice Specific Fan Power

Laboratory system	Specific Fan Power [W/l/s]
General laboratory supply air AHUs with heating and cooling	1.5
General laboratory extract systems	1.2
Laboratory local extract ventilation – ducted	1.0
Containment area extract, without HEPA filtration	1.5
Containment area extract, with HEPA filtration	2.5
Fume cupboard extract	1.5

Relevant definitions

Laboratory Areas: A laboratory is a facility designed for collection, processing and/or testing of specimens or procedures, some of which may be hazardous. In order to maintain controlled conditions to enable experiments and comply with health and safety standards, typically laboratories:

- Contain various exhaust and containment devices (such as fume cupboards and microbiological safety cupboards)
- Are heavily serviced to circulate air and to supply heating, cooling, humidity, and clean air
- Often require 24-hour access and fail-safe redundant backup systems and uninterrupted power supply or emergency power to enable irreplaceable experiments.

As a consequence laboratories can consume up to 4 times more energy than the typical office.

From www.labs21.org.uk:

Different types of laboratories have different requirements for HVAC, plug load equipment and access. This can lead to enormous variations in energy and water requirements.

The main types of laboratories include:

Wet laboratories - where chemicals, drugs or other material or biological matter are tested and analysed requiring water, direct ventilation and specialised piped utilities. Typically includes chemical science laboratories. These laboratories require specially designed facilities.

Dry laboratories - contain dry stored materials, electronics, and/or large instruments with few piped services. Typically includes engineering or analytical laboratories that may require accurate temperature and humidity control, dust control, and clean power.

Microbiological/clinical laboratories - often involve working with infectious agents. Typically require higher levels of primary containment and multiple secondary barriers including specialized ventilation systems to ensure directional air flow, air treatment systems to decontaminate or remove agents from exhaust air, controlled access zones, airlocks as laboratory entrances, or separate buildings or modules to isolate the laboratory.

***In vivo* laboratories** - these require highly controlled environments for the care and maintenance of flora and fauna. The facilities are complex, and expensive to build and to operate. Tight environmental

control over the facility is required to avoid the introduction of contaminants or pathogens, and prevent the possibility of infectious outbreaks, and avoid the transmission of odours.

Teaching laboratories - unique to academic institutes, they require space for teaching equipment, storage space for student belongings and less instrumentation than research labs.

Cleanrooms - refers to a controlled environment (air quality, temperature and humidity) which prevent contamination and the regulating of environmental conditions, to facilitate accurate research and production needs. Typically used in UK universities for Nanotechnology, medical and pharmaceutical research/studies and microelectronics applications.

Further information on the more complex items in Table 11 Best Practice Energy Practices in Laboratories

Note: *The notes below are provided as a means of explanation and advice concerning the items in the above tables, they are not part of the assessment criteria.*

Items a. and c. Volume flow rates for fume cupboards

BS EN 14175[6] defines a fume cupboard as a protective device to be ventilated by an induced flow of air through an adjustable working opening.

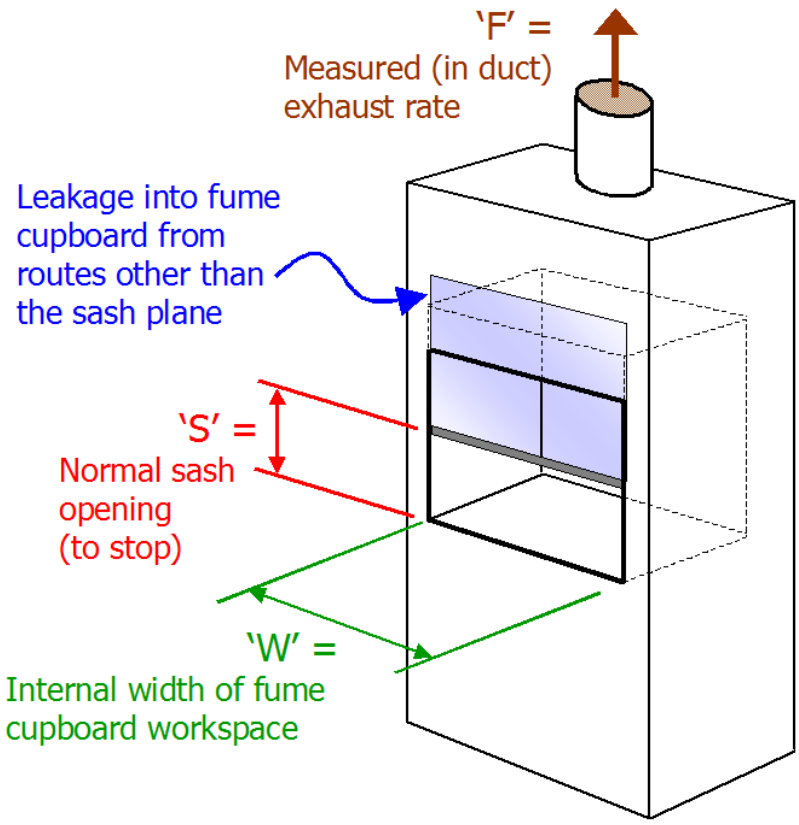


Figure 1: Conventional vertical-sash fume cupboard

The figure above demonstrates a traditional arrangement for a fume cupboard, this arrangement would typically involve:

- A constant volume configuration, that is, as the sash is lowered it uncovers a by-pass grille at high level on the front face of the fume cupboard.
- Flat, non-aerodynamic sides so that the internal width of fume cupboard workspace ('W') is very close to the external dimension.
- A normal sash opening height, to stop, ('S') of 0.5m.
- A volume flow rate expressed to produce a face velocity ('W' x 'S') of 0.5ms-1.

It should also be noted that the exhaust airflow will increase further as a result of leakage into the fume cupboard from routes other than the sash opening (good practice would have an objective of <5%, although levels of >25% are not unknown in the UK). The overall airflow situation for a flat-sided, vertical-sash fume covered can therefore be summarised as:

- Exhaust Airflow 'F' = 'W' x 'S' x Face Velocity + Leakage

Applying the traditional norms and considering a 1.0m wide fume cupboard gives an exhaust airflow demand per linear (internal) metre of:

- Exhaust Airflow 'F' = 1.0m x 0.5m x 0.5ms-1 + Leakage
- Exhaust Airflow 'F' = 0.25m^3s-1 + Leakage

Reductions in exhaust air flows can be achieved.

A range of tried and tested options are available to reduce exhaust air flows below the traditional norm of 0.25m^3s-1. These include:

- Reduced volume flow rates (translating into lower face velocities), being enabled/validated by means of objective risk analysis.
- Improved aerodynamics producing effective containment with lower volume flow rates/face velocities.
- Lower sash openings (reduced sash stop settings): for instance Scandinavian experience supports 0.4m (rather than 0.5m) as producing advantages in ergonomics, safety, and energy efficiency.
- Reduced width of sash opening (per linear metre of internal space): examples can include the use of aerodynamic entry 'cheeks' and horizontal/combination sashes.
- Reduced leakage.
- Variable air volume (VAV) extract with VAV supply tracking for make-up air with + 10% accuracy.

The application of this metric must necessarily recognise a variety of factors associated with the installation of fume cupboards in labs, including:

- All flow rates should be measured at the cupboard exhaust to ensure that leakage is taken into account.
- Where there are multiple fume cupboard exhaust duct connections from the laboratory the total shall be used in the calculation of the metric.
- Where variable air volume (VAV) exhaust control systems are provided the average airflow rate shall be used ('F' = 0.5['F_{open}'+'F_{closed}'] where 'F_{open}' is the situation with all fume cupboards open and 'F_{closed}' is the situation with all fume cupboards closed).
- Where a laboratory exhaust system is arranged to have a night set-back condition (for example, such as 100% system flow rate for 12 hours/day when a particular lab is likely to be occupied and a reduction to 50% for 12 hours/day when the lab is unoccupied), then the time-weighted average value for 'F' shall be calculated. This type of system is associated with situations in which a 24 hour flow through the fume cupboard(s) is required for reasons of safety, irrespective of the presence of users.

- The flow of CAV cupboards with two position operation should be calculated as the average of the high and low flow rates.
- For horizontal sash fume cupboards (with multiple, overlapping, horizontally-sliding sash panes) the operating conditions (sashes open and closed) shall be as defined and set out in Part 3 of BS EN 14175.

Although a variety of sizes and types of fume cupboard may be installed in a laboratory, the metric will be unaffected since the total of the internal spaces will be used in the calculation. Examples of situations justifying the award of the credit can be given, as below:

Example 1: Lab with 6 x 1.5m Constant Volume Fume Cupboards

- Sash height ('S') set at 0.4m.
- Aerodynamic 'cheeks' giving a sash opening of 1.2m (for 'W' = 1.5m).
- Face velocity of 0.45ms-1.
- Leakage of 5%.
- Total exhaust volume 'F' = 6 x 0.4 x 1.2 x 0.45 x 1.05 = 1.3608m^3s-1.
- Total linear m (fume cupboard internal workspace) = 6 x 1.5 = 9.0m.
- Exhaust volume/linear metre = 1.3608m^3s-1/9.0 = 1.512m^3s-1, and therefore qualifies for the award of the first credit on the basis of being <0.16m^3s-1.

Example 2: Lab with 10 x 1.4m Variable Volume Fume Cupboards

- Sash height ('S') set at 0.5m.
- Flat sides giving a sash opening of 1.4m (for 'W' = 1.4m).
- Face velocity of 0.4ms-1.
- Leakage of 5%.
- Total VAV exhaust volume with sashes open 'Fopen' = 10 x 0.5 x 1.4 x 0.4 x 1.05 = 2.94m^3s-1.
- Total VAV exhaust volume with sashes closed (turndown of 4:1) 'Fclosed' = 0.25 x 2.94 = 0.735m^3s-1.
- Average (sashes open and closed) total VAV exhaust volume 'F' = 0.5 (2.94 + 0.735) = 1.8375m^3s-1.
- Total linear m (fume cupboard internal workspace) = 10 x 1.4 = 14.0m.
- Exhaust volume/linear metre = 1.8375m^3s-1/14.0 = 1.3125m^3s-1, and therefore qualifies for the award of the first credit on the basis of being <0.16m^3s-1.

Item b. Fan Power

The figures in Table 12 Best Practice Specific Fan Power are based on best practice and experience at the University of Cambridge. Fan power requirements can be reduced by a variety of means, including:

- Use of variable speed drives.
- Use of VAV fume cupboards and other containment devices with modular (or VAV) extract fans.
- Low pressure drop design, which aims to reduce resistance within the ventilation system by techniques such as low pressure drop air handling units, optimised sizing of ducts and optimised layouts to reduce unnecessary bends and distortions (most easily enabled by use of 3D modelling software).

Item d. Grouping and/or isolation of high filtration/ventilation activities
The aim of this strategy is to avoid disproportionately high ventilation rates in all, or a significant proportion, of a laboratory simply because it is required by a few activities or items of equipment. Examples include:

- Isolation of areas with higher standards (fewer particles per cubic metre of air) in clean rooms so that the need for higher air flows is confined to a part of the room.

- Specification of Individually Ventilated Cages (IVC) and isolators (where applicable) to provide individual conditions where needed, to reduce the need for high air change rates for the entire space, subject to agreement with the local Home Office inspector.

Items e. and f. Energy recovery

This should be by controllable methods (e.g. face & bypass) to avoid recovering unwanted heat that leads to re-cooling or re-heating.

Item i. Load responsiveness

The aim of this strategy is to reduce the energy consumption of laboratory-specific equipment or systems by avoiding plant operating at sub-optimal levels of load and/or creating wasted outputs through a greater responsiveness to changes in demand. Examples of how this can be achieved include:

- Installation of modularised cooling or ventilation so that units can be switched off at periods of low demand.
- Specification of variable flow pumping systems in which the variable flow system is designed to reduce energy consumption, not for other purposes (e.g. commissioning adjustments).
- Demand controlled ventilation related to laboratory activities, e.g. through measurement of pollutants (i.e. excluding conventional CO2-based occupancy sensing).

Note: Installation of VAV fume cupboards and/or use of variable speed drives are generally excluded from this item as they are taken into account through items a., b. and c. However, the provision of controls that allow face velocities to be adjusted to individual fume cupboards in large VAV fume cupboard installations does qualify.

Item j. Particle monitoring systems in clean rooms

From an energy perspective, these systems are of benefit if they are used to reduce the air change rates within clean rooms. Hence, evidence must be provided that this has been achieved through linkages to air flow controls.

Item k. Diversity

Where large numbers of fume cupboards or similar containment devices are used, it is very unlikely that all will be operating at maximum flow rates simultaneously. Hence, diversity factors can be applied to central plant sizing and laboratory duct sizing. The levels achieved should be equivalent to, or better than, recent Oxford University installations where a diversity of 70% has been applied to the laboratory, and 50% to central plant. Note that the safety of any such diversity factors must be assessed in accordance with BS EN 14175 and other relevant guidance.

l. Air change rates

In most new or refurbished laboratories, specified air change rates are not evidence-based but are derived from ‘traditional’, empirically-derived, norms or long standing operational codes which have not been updated. Achieving this credit requires a calculated and validated matching of ventilation airflows to environmental needs and the demands of containment devices, which will require:

- Identification of a documented reference case against which the achieved air change rates can be compared, e.g. a similar facility, guidance materials, and a demonstration that a lower air change rate has been achieved;
- Calculation of the ventilation air flow necessary to ‘feed’ the various containment devices located within the laboratory having given due regard to commissioning and operational tolerances, variable volume system diversity, future flexibility, and control/pressure regime functional bands;
- Calculation of the ventilation air flow necessary to satisfy other demands within the laboratory including those of occupancy, equipment heat gain, lighting heat gain, and solar gains;

- Use of techniques such as mock-ups/full-size modelling and Computational Fluid Dynamics (CFD) to verify the effectiveness of the proposed design solutions (investigating issues including 'spot' air change rates, spillage clearance performance, and air input system/containment device interactions);
- Assurance that the chosen air change rates do not jeopardise safety (which will normally involve acceptance by relevant health and safety authorities, e.g. university safety officers, Home Office inspectors).

Issue ID	Issue Title	No. of credits available	Minimum standards
Ene 20	Energy Efficient IT Solutions	1	No

Aim

To recognise and encourage efficient specification, design and use of *data centres* and *IT-intensive operating areas*.

Assessment Criteria

The following demonstrates compliance:

Higher Education Buildings only

Data centres

1. The *data centre* is designed in accordance with the '*Best practices for the EU Code of Conduct on Data Centres*'[74] principles with the *data centre* achieving at least the 'Expected minimum practice' level (as defined in the *Code of Conduct*).

2. Temperature set points are not less than 24^{o}C, as measured at the inlet of the equipment in the rack.

IT-intensive operating areas

3. The *IT intensive operating area* uses a natural ventilation and cooling strategy as standard, with forced ventilation only to be used when the internal temperature exceeds 20^{o}C and active cooling only when the internal temperature exceeds 22^{o}C.

4. There is a mechanism to achieve automatic power-down of equipment when not in use, including overnight.

Compliance Notes	
New Build	There are no additional or different criteria to those outlined above specific to new-build projects.
Refurbishment	There are no additional or different criteria to those outlined above specific to refurbishment projects.
Extensions to existing buildings	There are no additional or different criteria to those outlined above specific to the assessment of extensions to existing buildings.
Fit out only	There are no additional or different criteria to those outlined above specific to fit out only assessments.

Schedule of Evidence Required

Req.	Design Stage	Post Construction Stage
1-3	A copy of the contract/specification clauses confirming: • That the data Centre will achieve 'Expected minimum practice' level (as defined in the Code of Conduct on Data Centres). • Ventilation/cooling strategy.	Written confirmation or demonstration that the 'Expected minimum practice' has been implemented. AND Copy of relevant section of commissioning report confirming that design set points have been achieved. OR 'As built' plans or specification clauses demonstrating compliant ventilation settings for IT-intensive areas and/or data centres.
4	Manufacturer's details or specification confirming the power-down strategy used.	Written confirmation or demonstration of the installation of the power-down method.

Additional Information

Relevant definitions

Data centre: For the purpose of this BREEAM issue, the term 'data centres' includes all buildings, facilities and rooms which contain enterprise servers, server communication equipment, cooling equipment and power equipment, and may provide some form of data service (e.g. large scale mission critical facilities all the way down to small server rooms located in office buildings).

I.T-intensive areas: These include computer areas where more than 1 PC per 5 m^2 is provided, e.g. training suites, design studios, libraries' I.T areas and other areas with a high density of computing devices.

Examples of methods that can be used to lower energy and heat within IT suites are specification of low power PCs, sharing of PCs between several users, or 'thin clients' (a client computer or software which uses a central server for processing information).

7.0 Transport

Issue ID	Issue Title	No. of credits available	Minimum standards
Tra 1	Provision of Public Transport	Up to 5	No

Aim

To recognise and encourage development in proximity to good public transport networks, thereby helping to reduce transport-related emissions and traffic congestion.

Assessment Criteria

The following demonstrates compliance:

1. The public transport *Accessibility Index* for the building is calculated and BREEAM credits awarded in accordance with Table 13 AI benchmarks and BREEAM credits:

Table 13 AI benchmarks and BREEAM credits

Accessibility Index	BREEAM credits available by building type		
	Pre-school / School / Sixth form	Further Education College / Higher Education type 1	Higher Education type 2
≥2	1	1	1
≥4	2	2	2
≥8	3	3	3
≥10	3	3	4
≥12	3	4	5
≥18	3	5	5

Higher Education type 1: H.E buildings located on a campus where less than 25% of students live on the campus or within 1km radius from the campus' main entrance.

Higher Education type 2: H.E buildings located on a campus where 25% or more of the students live on the campus or within 1km radius from the campus' main entrance.

The *Accessibility Index* is determined by entering the following information in to the BREEAM assessor's TRA 1 *Provision of Public Transport calculator:*

a. The distance (m) from the *main building entrance* to each *compliant public transport node* (Note: Assessments of higher education buildings please refer to the compliance note below '*campus or building main entrance' for additional guidance*).
b. The public transport type serving the compliant node e.g. bus or rail.
c. The *average number of services* stopping per hour at each *compliant node* during the standard *operating hours* of the building for a *typical day* (see compliance notes and Table 14 in the Additional Guidance section).

Schools only

2. Where there is a dedicated bus service to and from the school at the beginning and end of the school day, **one credit** can be awarded regardless of the building's public transport *Accessibility Index*.

Compliance Notes	
New Build	There are no additional or different criteria to those outlined above specific to new-build projects.
Refurbishment	There are no additional or different criteria to those outlined above specific to refurbishment projects.
Extensions to existing buildings	There are no additional or different criteria to those outlined above specific to the assessment of extensions to existing buildings.
Fit Out Only	There are no additional or different criteria to those outlined above specific to fit out-only assessments.
Higher Education: Campus' or building main entrance	Where 80% or more of the buildings on the campus is within 1000m of the **campus' main entrance, then the campus' main entrance can be used** as the reference point for the assessment of distance to *complaint public transport node* for this issue. The campus' main entrance is that which is accessed by the majority of the building's staff, students and visitors. A site may have more than one main entrance which between them account for the majority of staff, students and visitors access the site. In such a case either entrance can be used as the basis for the calculation. Where less than 80% of the buildings on the campus are within 1000m of **the campus' main entrance, the assessed building's main entrance must be used** as the reference point for the assessment of distance to *complaint public transport node* for this issue. This rule implies that for a large campus, when distances are too great to be comfortably covered by walking, public transport nodes would need to be located inside or on the periphery of the campus. Where the building is not part of a campus or it is one of a number of scattered buildings within an urban boundary which makes up the Higher Education Institute, then the assessed buildings main entrance must be used as the reference point for the assessment of this issue.

Operating hours	BREEAM seeks to define the building's accessibility to the public transport network for the period during which the majority of building users will travel to and from the building. In most cases the normal operating hours of the building can be used; however, some buildings will operate for 24 hours a day and on a shift work basis. As a result, during what typically would be deemed unsociable hours and therefore periods where a) there is little if any public transport operating and b) the number of total building users travelling to the building during this time is a minority; such periods are not required to be accounted for in the assessment of this issue. Where the assessed building operates on a 24-hour basis, or the operating hours are unknown at the time of assessment, then refer to and use the table of default operating hours, which can be found in the Additional Information section of this issue.
Compliant public transport node	A compliant node includes any bus stop within 650m and any railway station within 1000m of the assessed building's main entrance, measured via a safe pedestrian route (not '*as the crow flies'*). The service stopping at each node must provide transport from, or onward travel to, either an urban centre, major transport node or a community focal point e.g. doctor's surgery, library, school or village centre. Only local services should be assessed and any national public transport services should be excluded from the analysis, unless such a service can be said to provide a local commuter service. There is no limit on the number of nodes that can be considered when calculating the AI, provided they all meet the above criteria.
Average number of services	For the purpose of the calculation, the frequency of public transport is the average number of services per hour. This is calculated by determining the number of stopping services at the node during the operating hours, divided by the number of hours within the operating period. For example: the average number of services for an assessment of a building that operates between 8am - 7pm (11 hours) and is within proximity of a bus stop with 35 stopping services during this period is 3 (equivalent to an average service frequency of 20 minutes).
Typical day	The typical day is that which represents the period when travel to and from the building by staff/users and visitors will be at its highest during term/semester time. For most buildings this should be taken as a mid-week day. In choosing a typical day the assessor should check that the timetabled information for that day is, within reason, representative of the public transport provision for the entire operating week (excluding Sundays).
Multiple services	Services that operate from more than one node within proximity of the building, i.e. two separate bus stops served by the same bus, must be considered only once - at the node in closest proximity to the building. Different services at the same node, however, should be considered as separate entities.
Bi-directional routes	Routes will be bi-directional; however for the purpose of calculating the index, consider only the direction with the highest frequency (in accordance with the PTAL methodology).
Dedicated transport services	Where a dedicated company bus service is provided for *building users* during, or before or after, *operating hours* (as defined in above), the building entrance can be substituted for the drop-off/pick-up destination point of this service and therefore public transport accessibility measured from that point.

Phased developments	In the case of a large phased development where new transport facilities will be provided, but at a later stage than the building being assessed, the assessment can consider such facilities provided that: • A commitment to provide transport facilities has been made in the General Contract Specification or in the form of a Section 106 Agreement. **And the shortest of the following periods - Either** • The transport facilities will be available for use by the time 25% of all phases have been completed and are ready for occupation. **Or** • The transport facilities will be available for use within 25% of the total build time for the phase in which the assessed building forms a part, measured from the completion date of that phase. The most appropriate rule for the development in question must be used, ensuring that the time building users have to wait before having use of the transport facilities is as short as possible. Where the transport facilities will not be available for use within a period of five years from occupation of the building, they cannot be considered for determining compliance with the BREEAM criteria.
Buildings in Greater London	Buildings in Greater London should refer to the guidance in the Additional Information section of this issue for details of demonstrating compliance via other complementary means.

Schedule of Evidence Required

Req.	Design Stage	Post Construction Stage
1	A copy of the output from the *Provision of Public Transport calculator* *. *Or via the alternative means for buildings in Greater London (see Additional Information). Scale map highlighting the location of the building and all public transport nodes in proximity of the building. Timetables for each service at each public transport node considered.	The evidence required at this stage is the same as that outlined at the design stage. Where relying on a calculation carried out at the design stage to demonstrate compliance post construction, if the period between design and post construction stage reporting is greater than 12 months, then the AI must be re-calculated using up-to-date public transport timetable information.
Schools only		
2	A formal letter from the school with details of the dedicated bus service(s).	The evidence required at this stage is the same as that outlined at the design stage.

Additional Information

Relevant definitions

Accessibility Index: A measure that provides an indicator of the accessibility and density of the public transport network at a point of interest (in the case of BREEAM, a building). The index is influenced by the proximity and diversity of the public transport network and the level or frequency of service at the accessible node.

Provision of Public Transport Calculator: A spreadsheet-based calculator used to determine the *Accessibility Index* for the assessed building and the number of BREEAM credits achieved. BREEAM calculators are provided in the BREEAM Assessor's spreadsheet tool.

Main building entrance: The main building entrance is the entrance to the assessed building accessed by the majority of the building's staff and visitors, not the site entrance (unless the site entrance is also the building entrance e.g. building with a boundary on a public highway).

AI Indicator of performance – comparison with previous version of BREEAM
For comparison with the criteria of previous versions of BREEAM, a building that has a single public transport node 500m from its main building entrance with one service stopping every 15 minutes i.e. 4 services per hour on average, will score an AI of approximately 1.90. Alternatively, the same node with one service every 15 minutes, but 300m from the building entrance will achieve an AI of 2.26. The same node with two services stopping every 15 minutes will score an AI of 2.85. The greater the number of compliant nodes, services and their proximity to the building, the higher the AI.

Table 14 Default hours of operation for a typical day

Building type	AM	PM
Office	8.00am - 7.00pm	
Industrial	8.00am - 7.00pm	
Pre-school, school, sixth form college	7.30am -10.00am	3.00pm - 5.30pm
Further & Higher Education	8.00am - 7.00pm	
Courts	8.00am - 7.00pm	
Prison	7am - 8pm (encompassing visiting hours and the typical daytime shift pattern)	
Healthcare	7am - 8pm (encompassing visiting hours and the typical daytime shift pattern)	
Shopping centre	9.00am - 7.00pm	
Supermarket	8.00am - 10.00pm	
Bank/Service provider	8.00am - 6.00pm	
Convenience store	7.00am - 10.00pm	
DIY/retail park	8.00am - 8.00pm	
Other retail	8.00am - 6.00pm	
Multi-residential	8.00am - 7.00pm	
Bespoke & other	8.00am - 7.00pm Or use any of the above hours, as appropriate to the building type.	
24 hour use building	7am - 8pm	

Calculation methodology
The methodology for calculating the *Accessibility Index* uses Transport for London's *Public Transport Accessibility Level* (PTAL) method, itself based on a methodology developed in 1992 by the London Borough of Hammersmith and Fulham. For a description of the PTAL methodology and how it works refer to appendix B of *Transport Assessment Best Practice; Guidance Document*: http://www.tfl.gov.uk/assets/downloads/corporate/TAGuidance_LQ.pdf

Buildings in Greater London
There is a public transport accessibility map for Greater London which can be used for determining the *Accessibility Index* for assessed buildings, without necessarily having to complete a separate calculation. This map can be found at: http://www.london.gov.uk/thelondonplan/maps-diagrams/map-2a-03.jsp

The map shows the Public Transport Accessibility Levels throughout London (PTALs range from 1-6); the PTAL is determined using the AI as follows:

PTAL	AI
1	0.00 – 5.00
2	5.01 – 10.00
3	10.01 – 15.00
4	15.01 – 20.00
5	20.01 – 25.00
6	25.01 +

As an example, if the building is located in an area of London that has a PTAL of 2 this could have an AI at any point in the 5-10 range. As such, for the purpose of BREEAM, the lower AI of 5 must be assumed and the credit awarded accordingly, or alternatively the specific AI for the assessed building can be determined using the TRA 1 *Provision of Public Transport calculator* and, potentially, a higher number of credits awarded.

Issue ID	Issue Title	No. of credits available	Minimum standards
Tra 2	Proximity to amenities	1	No

Aim

To encourage and reward a building that is located in proximity to local amenities, thereby reducing the need for extended travel or multiple trips.

Assessment Criteria

The following demonstrates compliance:

Pre-school, Schools, Sixth Form and Further Education buildings

1. Where the building is within 500m of the following amenities:

    a. Grocery shop and/or food outlet
    b. Post box
    c. Cash machine

Higher Education buildings

1. Where the building is within 500m of at least five of the following amenities, or where at least five of the following amenities are located within the same campus as the assessed building:

    a. Grocery shop and/or food outlet
    b. Post box
    c. Cash machine
    d. Leisure / sport centre
    e. Library
    f. Student union
    g. Medical facility / GP surgery.

Compliance Notes	
New Build	There are no additional or different criteria to those outlined above specific to new-build projects.
Refurbishment	There are no additional or different criteria to those outlined above specific to refurbishment projects.
Extensions to existing buildings	There are no additional or different criteria to those outlined above specific to the assessment of extensions to existing buildings.
Fit Out Only	There are no additional or different criteria to those outlined above specific to fit out-only assessments.
Food Outlet	This includes the following: • Grocery shop • Supermarket • Sandwich shop • On- or off-site cafeteria or staff canteen

Collective amenities	One type of amenity may also exist within or a part of other types of amenities e.g. grocery store in a petrol station, cash point or pharmacy in a supermarket etc. It is not a requirement of the assessing this issue that each amenity is 'stand alone'.
Accessible local amenities	The distance must be measured via safe pedestrian routes e.g. pavements and safe crossing points or, where provided, dedicated pedestrian crossing points. The distance should not be measured in a straight line, '*as the crow flies'*.
Amenities within building	An amenity within the building, or in the case of further or higher education buildings located on the same campus, complies with the assessment criteria.
Phased developments	The guidance provided in BREEAM issue Tra 1, concerning phased developments, also applies to this issue.

Schedule of Evidence Required

Req.	Design Stage	Post Construction Stage
1	Marked-up site plan or map highlighting: • Location of assessed building • Location and type of amenities • The route to the amenities • Plan/map scale	Assessor's building/site inspection and photographic evidence confirming: • The existence of the local amenities • The route and distance to the amenities.
	Where the amenities do not currently exist, but are due to be developed, a letter from the client/developer confirming: • The location and type of amenities to be provided • The timescale for development of the amenities.	Evidence as outlined at the design stage of assessment. **OR** As above where amenities developed, or under development at the time of post construction review/assessment.

Additional Information

Relevant definitions
None.

Issue ID	Issue Title	No. of credits available	Minimum standards
Tra 3	Cyclist Facilities	2	No

Aim

To encourage building users to cycle by ensuring adequate provision of cyclist facilities.

Assessment Criteria

The following demonstrates compliance:

First credit – Primary schools

1. A minimum of five *compliant cycle storage spaces* have been provided for each form/class in any one year group.

   For example: where a primary school has been designed to accommodate 3 classes per year, a total of 15 *compliant cycle storage spaces* are provided for the whole school.

First credit – Pre-school (staff only), Secondary schools, sixth form, Further and higher education (staff and pupils/students)

1. The number of *compliant cycle storage spaces* provided is as follows:

   a. 10% of *building users* up to 500 **PLUS**
   b. 7% for *building users* in the range of 501 – 1000 **PLUS**
   c. 5% for *building users* over 1000

   See Compliance Notes for definition of *building users.*

Second credit – Pre-school, primary school and higher education (staff only) and secondary schools, sixth form and further education (staff and pupils/students)

1. The first credit must be achieved.

2. At least two of the following *compliant facilities* must be provided for the *building users*:

   a. Compliant showers
   b. Compliant changing facilities and lockers for clothes
   c. Compliant drying space for wet clothes

   See Compliance Notes for definition of *building users.*

Compliance Notes	
New Build	There are no additional or different criteria to those outlined above specific to new-build projects.
Refurbishment	There are no additional or different criteria to those outlined above specific to refurbishment projects.
Extensions to existing buildings	Refer to the compliance note below on existing compliant facilities.

Fit Out Only	There are no additional or different criteria to those outlined above specific to fit out-only assessments.
Building users	Where the term 'building users' is referenced, for the purpose of calculating the compliant cycle storage facilities this refers to the typical number of staff and estimated or actual number of pupils/students likely to be using the building during a typical academic term-time/semester day. The following are exceptions to this definition: • The first credit (cycle storage) for pre-school buildings, where building users are defined as staff only. • The second credit (cycle changing facilities) for pre-schools, primary schools and higher education, where building users are defined as staff only. For assessments of higher education buildings, where the term *staff* is used, this includes PhD students and Post-Doctorates. Undergraduate, Diploma and Masters attendees are considered to be *students* for the purpose of assessing this BREEAM issue. The requirement for provision of cyclist facilities based on staff and student/pupil numbers also accounts for other community users who will use the building, it is therefore not necessary to estimate and include within the calculation the number of predicted community users.
Compliant cycle storage space	Compliant cycle storage facilities are those that meet the following: • The space is covered overhead and protected from the rain • The covered area and the cycle racks are set in or fixed to a permanent structure (building or hardstanding) and allow both the wheel and frame to be locked securely (e.g. Sheffield type). Or racks are located in a locked structure fixed to or part of a permanent structure with CCTV surveillance. • There is a minimum distance of 1.0m between cycle racks, where the racks allow for two-sided parking, and 0.8m for one-sided parking to enable bikes to be easily stored and accessed. • Racks positioned in a circular array are spaced in accordance with the guidance in the New Metric Handbook[75]. • There is a minimum distance from any obstruction e.g. wall (located either to the side of the stand or in front of it) of 300mm for single-sided use and 900mm for double-sided use. • Adequate lighting is provided in accordance with BS5489 Part 1 – *Lighting of roads and amenity areas*[76]. • The facilities are in a prominent site location that is viewable from the building. • The majority of the cycle racks are within 100m of a building entrance (ideally within 50m). Or, in the case of further or higher education buildings on a campus, where it is not feasible to meet the 100m requirement but the assessor justifiably deems that the facilities are in an easily accessible location (but still within the campus) for building users, the credit may still be awarded.
Vertical bike racks	Vertical racks, which allow direct access (without the need to get alongside the locked bike) and permit one bike per vertical stack can comply with the criteria (provided all other criteria are met). For this type of rack, the distance between each rack can be less than 1.0m but not less than 600mm (the typical width of a bike across the handlebars).

Proprietary cycle storage systems	Where a proprietary (manufactured) bicycle storage system is specified BREEAM allows an element of flexibility with respect to the requirements and dimensions outlined in the compliance note above. The degree of flexibility is at the discretion of the BREEAM Assessor, but the system must allow ease of access for the user and each cycle to be removed independently of other stored bikes, must protect the bikes from rain, and allow cyclists to lock at least one wheel and the frame of their bikes adequately. If the assessor believes that a system does not meet these basic objectives then they should not award the credit. Where awarding the credit for a proprietary system that does not meet the space/access/weatherproofing/security dimensions and requirements (outlined above) the Assessor must fully justify their decision to award the credit in these circumstances.
Non compliant cycle racks	These types of cycle storage devices do not comply with BREEAM: • Hooks and wall attachments • Single wheel (butterfly) bike rack holders (these racks provide less security and can cause damage to bike wheels).
Compliant showers	In the case of a pre-school or primary school one shower must be provided for every 10 **staff** (subject to a minimum of one shower). In secondary, sixth form and further education buildings, one shower must be provided for every 10 cycle storage spaces. In the case of a higher education building, one shower must be provided for every 10 staff cycle storage spaces. Both male and female users catered for i.e. either separate showers within shared gender-specific facilities or single shower cubicles and changing space for mixed use. The showers can be available for others to use in addition to staff.
Compliant changing facilities & lockers	Changing facilities and locker criteria; • The assessor can use their judgement to determine whether the changing area is appropriate given the number of cycle storage spaces/showers provided. As guidance to aid the assessor, where a shower/changing cubicle is provided there should be a minimum of one square metre of changing space adjacent to the shower(s) with a bench seat and hooks for hanging clothes. Where there is more than one shower provided there should be a minimum of one square metre of changing space per shower, subject to a minimum changing area of four square metres. Where there are no showers specified, but there is a changing facility, there is a minimum of one square metre of changing space for every 10 cycle storage spaces, subject to a minimum of four square metres of changing area with a bench seat and hooks for hanging clothes. • The number of lockers is at least equal to the number of cycle spaces provided. • Lockers are either in or adjacent to compliant changing rooms. Where the changing space is a cubicle the locker(s) must not be located within the cubicle. • Each locker is at least 900mm high by 300mm wide by 450mm deep, or a locker with dimensions that provide an equivalent volume of storage space. • Both male and female users are catered for i.e. either gender specific, shared facilities or single changing cubicles in mixed use areas. • Toilet cubicles do not count as changing facilities.
Compliant drying space	The drying space (for wet clothes) must be a specially designed and designated space with adequate heating/ventilation. A plant room is not a compliant drying space.
Pre-school and/or crèche	When assessing a pre-school or an education building that contains a crèche, in line with the definition of *building users* (above), the children (and their families) should not be included in the calculation of the number of required *compliant cycle spaces*.

Existing compliant facilities	For assessments of new *infill* buildings on an existing site, where there are existing compliant facilities, such facilities can be assessed against the criteria of this issue. The number of existing compliant facilities must be large enough to cater for the building users of the assessed building, in addition to the users from any existing buildings
Minimum number of facilities	Where more than the minimum number of compliant cycle spaces is provided, it is not necessary to also provide more than the minimum number of showers/lockers/changing facilities.
Pre-School, Schools & Sixth Form	
Showers (secondary schools)	The provision of showers for staff and pupils must be separate.
Less than 100 pupils (secondary schools)	Where there are less than 100 pupils, a minimum of 2 showers must be provided for pupils with one male and one female shower (where applicable). A minimum of one shower for staff should be provided in all cases.
Secondary schools – cycle facilities	In secondary schools, the cycle storage facilities must be located in a prominent location which is overlooked by reception/school offices or the staffroom.
Primary Schools - number of classes	Where there are varying numbers of forms/classes per year, the calculation of *compliant cycle spaces* must be based on the year with the greatest number of classes/forms.
City centre locations & cycle space and facilities provision	In city centre locations the criteria for *compliant cycle spaces* can be reduced by 50% where at least **two** of the available BREEAM credits for provision of public transport (Tra 1) have been awarded.
City centre locations & showers provision	As with *compliant cycle spaces*, the requirement for *compliant showers* in pre and primary schools in city centre locations can also be reduced by 50%. Note: The number of *compliant showers* in secondary schools and sixth form colleges will reduce by default since the calculation is based on the number of cycle storage spaces provided (which can be reduced by 50% for city centre locations).
Rural locations & showers provision in primary schools	As with *compliant cycle spaces*, the requirement for *compliant showers* in pre and primary schools can also be reduced by 50%. Note: The number of compliant showers in other education building types will reduce by default since the calculation is based on the number of cycle storage spaces provided.
Further & Higher Education colleges	
City centre locations & cycle space provision	Sites in city centre locations can reduce by 50% the criteria for *compliant cycle spaces* where at least **three** of the available BREEAM credits for provision of public transport (Tra 1) have been awarded.
Rural locations & cycle space provision	Sites in rural locations can reduce by 50% the criteria for *compliant cycle spaces* where the average building user commuting distances are likely to be greater than 10 miles. A rural location is one where the site is on land clearly not within or on an urban boundary; this includes village locations and green field sites.

Schedule of Evidence Required

Req.	Design Stage	Post Construction Stage
First credit and Second credit		
1	Site plan, design drawings and/or a copy of the specification confirming: • The location of the cycle storage facilities • The number of cycle spaces provided • The type, dimensions and layout of cycle racks • The materials and construction specified for the facility. • The lighting for the facility is in accordance with BS5489 Part 1. • Building occupancy or, where relevant, net lettable/floor area. Where the building is in a city centre location, and the benchmarks reduced, evidence as outlined under BREEAM credit Tra 1 demonstrating the relevant number of credits achieved.	Assessor's building/site inspection and photographic evidence confirming the installation of the compliant facilities.
2	Design drawings or a copy of the specification confirming: • Number of showers • Changing room • Secure locker locations, dimensions and numbers • Drying space	Assessor's building/site inspection and photographic evidence confirming the installation of the compliant facilities.

Additional Information

Relevant definitions
None.

Issue ID	Issue Title	No. of credits available	Minimum standards
Tra 4	Pedestrian and Cyclist Safety	1	No

Aim

To recognise and encourage the provision of safe and secure pedestrian and cycle access routes on the development.

Assessment Criteria

The following demonstrates compliance:

1. Where external site areas form part of the assessed site and these areas contain vehicle access roads, parking and/or pedestrian access to the building, adequate cycle lanes and pedestrian pathways must be provided. If the building does not have any external areas and internal access is directly from the public highway/footpath, then the credit(s) can be awarded on a default basis.

Cycle access criteria

2. The cycle lanes have been designed and constructed in accordance with the guidance in the National Cycle Network *Guidelines and Practical Details – issue 2*, Sustrans[77] and the relevant parts of Appendix VI *NCN Design and Construction Checklist*[78]

3. The cycle lanes and pedestrian paths meet the following minimum width dimensions:

    a. Where pedestrian and cycle routes are shared the minimum total width of the combined path is 3.0m
    b. Where the cycle lane is segregated from both the pedestrian route and carriageway the minimum width of the cycle path is 2.0m and the minimum width of the pedestrian path is 1.5m
    c. Where the cycle route forms a part of the carriageway, the minimum width of the lane is 1.5m

    Minimum widths should not be regarded as the design target, where possible best practice as detailed in the Sustrans guidelines and DfT[79] guidance must be aimed for.

4. Cycle lanes provide direct access to any cycle storage facilities provided on the site, without the need to deviate from the cycle path and, if relevant, connect to offsite cycle paths where these run adjacent to the development's boundary.

Pedestrian access criteria

5. Onsite footpaths connect to public footpaths off site, providing access to local transport nodes and other offsite amenities (where present).

6. Where provided, drop-off areas are designed off the access road and provide direct access to pedestrian pathways/areas, therefore avoiding the need for the pedestrian to cross vehicle access routes.

7. Where dedicated pedestrian crossing of a vehicle access route is provided, the road is raised to the pavement level (i.e. the pavement is not lowered to road level).

8. For larger developments with a high number of public users/visitors, pedestrian pathways must be signposted to other local amenities off site, including public transport nodes.

Combined cyclists and pedestrian access criteria

9. Delivery areas are not accessed through parking areas and do not cross or share pedestrian and cyclist routes and other outside amenity areas accessible to building users and general public.

10. Lighting design of pedestrian pathways and cycle paths on site are in compliance with CIBSE Lighting Guide 6 (LG6)[29] and BS5489 Part 1[76].

Compliance Notes	
New Build	There are no additional or different criteria to those outlined above specific to new-build projects.
Refurbishment	There are no additional or different criteria to those outlined above specific to refurbishment projects.
Extensions to existing buildings	There are no additional or different criteria to those outlined above specific to the assessment of extensions to existing buildings.
Fit Out Only	There are no additional or different criteria to those outlined above specific to fit out-only assessments.
NCN Design and Construction checklist	The checklist can be downloaded from: http://www.sustrans.org.uk/webfiles/guidelines/appendix.pdf
Covered parking area	Where the assessed building has no external areas but does have a covered parking facility and cyclists and/or pedestrians access the assessed building via this area, then the criteria apply and this area must be assessed against them.

Schedule of Evidence Required

Req.	Design Stage	Post Construction Stage
1 & 3-9	A scaled proposed site plan, specification and/or design details highlighting all necessary features and dimensions.	Assessor's building/site inspection and photographic evidence confirming compliance. **AND/OR** 'As built' site plan and design details.
2	A copy of the specification or scaled proposed site plan confirming: • Cycle routes have been or will be designed in accordance with the best practice guidance[1] **AND** • A signed and dated copy of the *NCN Design and Construction Checklist* from the design/project team (or completed by the assessor using design information).	A signed and dated post construction copy of the *NCN Design and Construction Checklist* from the design/project team (or completed by the assessor during their site visit).

10	A copy of the specification, site plan and/or manufacturer's technical details. confirming: • External lighting design strategy.	Assessor's building/site inspection and photographic evidence confirming compliant installation. The assessor is not expected to check every detail but that the lighting strategy is broadly compliant with the design and therefore relevant guidance, demonstrated by checking compliance at their discretion with select key issues.

Additional Information

Relevant definitions
None.

Issue ID	Issue Title	No. of credits available	Minimum standards
Tra 5	Travel Plan	1	No

Aim

To recognise the consideration given to accommodating a range of travel options for building users, thereby encouraging the reduction of user reliance on forms of travel that have the highest environmental impact.

Assessment Criteria

The following demonstrates compliance:

1. A travel plan has been developed as part of the feasibility and design stages which considers all types of travel relevant to the building type and *users*.

2. The travel plan is structured to meet the needs of the particular site and takes into consideration the findings of a site-specific transport survey and assessment that covers the following (as a minimum):

    a. Where relevant, existing travel patterns and opinions of existing *building or site users* towards cycling and walking so that constraints and opportunities can be identified
    b. Travel patterns and transport impact of future *building users*
    c. Current local environment for walkers and cyclists (accounting for visitors who may be accompanied by young children)
    d. Disabled access (accounting for varying levels of disability and visual impairment)
    e. Public transport links serving the site
    f. Current facilities for cyclists

3. The travel plan includes a package of measures that have been used to steer the design of the development in order to meet the travel plan objectives and minimise car-based travel patterns. This is demonstrated via specific examples such as:

    a. Providing parking priority spaces for car sharers
    b. Providing dedicated and convenient cycle storage and changing facilities
    c. Lighting, landscaping and shelter to make pedestrian and public transport waiting areas pleasant
    d. Negotiating improved bus services, i.e. altering bus routes or offering discounts
    e. Restricting and/or charging for car parking
    f. Criteria for lobby areas where information about public transport or car sharing can be made available
    g. Pedestrian and cycle friendly (for all types of user regardless of the level of mobility or visual impairment) via the provision of cycle lanes, safe crossing points, direct routes, appropriate tactile surfaces, well lit and signposted to other amenities, public transport nodes and adjoining offsite pedestrian and cycle routes.

Compliance Notes	
New Build	There are no additional or different criteria to those outlined above specific to new-build projects.

Refurbishment	There are no additional or different criteria to those outlined above specific to refurbishment projects.
Extensions to existing buildings	There are no additional or different criteria to those outlined above specific to the assessment of extensions to existing buildings.
Fit Out Only	There are no additional or different criteria to those outlined above specific to fit out-only assessments.
Building users	Where the term *building users* is referenced in this BREEAM issue it refers to staff, pupils/students, parents, community users and personnel who make deliveries to the development.
Existing Travel Plan	The credit can be awarded if the building being assessed is a refurbishment or infill new build on an existing site that has an existing up-to-date travel plan that is compliant with BREEAM and applicable to all building users (in the existing and assessed buildings).

Schedule of Evidence Required

Req.	Design Stage	Post Construction Stage
1-3	A copy of the Travel Plan. A copy of the site-specific transport survey/assessment.	The evidence required at this stage is the same as that outlined at the design stage.
3	A marked-up copy of the site plan demonstrating examples of design measures, implemented in support the travel plan's findings. **OR** Where a detailed site plan is not available, a formal letter from the client confirming that measures will be implemented into the final design in support the travel plan's findings.	Assessor's building/site inspection and photographic evidence confirming: • The installation of measures that support the travel plan.

Additional Information

Relevant definitions

Travel Plan: A travel plan is a strategy for managing all travel and transport within an organisation, principally to increase choice and reduce reliance on the car by seeking to improve access to a site or development by sustainable modes of transport. A travel plan contains both physical and behavioural measures to increase travel choices and reduce reliance on single-occupancy car travel.

Issue ID	Issue Title	No. of credits available	Minimum standards
Tra 6	Maximum Car Parking Capacity	2	No

Aim

To encourage the use of alternative means of transport to the building other than the private car, thereby helping to reduce transport related emissions and traffic congestion.

Assessment Criteria

The following demonstrates compliance:

First credit - Higher Education buildings only

1. No more than one parking space is provided for every fifteen *building users*.

Second credit - Higher Education buildings only

1. No more than one parking space is provided for every twenty *building users*.

Compliance Notes	
New Build	There are no additional or different criteria to those outlined above specific to new-build projects.
Refurbishment	There are no additional or different criteria to those outlined above specific to refurbishment projects.
Extensions to existing buildings	There are no additional or different criteria to those outlined above specific to the assessment of extensions to existing buildings.
Fit Out Only	There are no additional or different criteria to those outlined above specific to fit out-only assessments.
Pre-school, schools, sixth form and FE colleges	This issue is not applicable for the assessment of pre-schools, schools, sixth form and further education colleges.
Building users	Where the term *building users* is referenced in this BREEAM issue it refers to the number of staff and students who will access the building for work or study during a typical academic term-time /semester day, (as oppose to using full-time equivalent figures).
Determining number of building users	If known actual building occupancy rate figures should be used. If this figure cannot be confirmed use the default occupancy rate detailed above under the *Shell Only* compliance note.
Variable occupancy	Where the number of *building users* is variable, provision of parking spaces should be based on the maximum number of building users likely to be using the building at any time during a typical day.

Disabled, mother & baby & motorbike spaces	Parking spaces for these building users can be excluded from the assessment of this issue provided these spaces are dedicated for this use and they are sized accordingly with the appropriate signage/markings.
Car share spaces	Car share spaces can be excluded from the assessment provided these spaces are dedicated for this use with the appropriate signage and the future building occupier confirms they have an enforceable car share policy. The assessor must obtain a copy of the policy and related documentation. Where there is no policy these spaces must be included within the calculation.
Parking shared with other buildings	Where the building being assessed forms part of a wider site development and parking is not designated to specific buildings, then this credit must be assessed on the provision of parking spaces for the whole development, accounting for all existing and new users and parking spaces. Where the numbers of users for the whole site cannot be confirmed, then the parking spaces can be attributed to the assessed development on the basis of the ratio of assessed building floor area to total building floor area of the whole site. E.g. if the assessed building is 20% of the total building area for the site then attribute 20% of the parking spaces to the building for the purpose of the assessment.

Schedule of Evidence Required

Req.	Design Stage	Post Construction Stage
1	A site plan or copy of the specification confirming: • Number and type of parking spaces provided for the building. Relevant documentation or correspondence from the design team or client confirming the number of building users.	Assessor's building/site inspection and photographic evidence confirming: • Number and type of parking spaces provided for the building. Evidence as outlined at the design stage. **OR** A physical check by the assessor of the relevant number of building users (if practical).

Additional Information

Relevant definitions
None.

Issue ID	Issue Title	No. of credits available	Minimum standards
Tra 7	Travel Information Point	1	No

Aim

To ensure the building has the capacity to provide users with up-to-date information on local public transport routes and timetables.

Assessment Criteria

The following demonstrates compliance:

Higher Education building only

1. There is a dedicated space for the provision of local public transport and taxi information.

2. There are no specific size criteria as the information could be presented using a wall-mounted lockable noticeboard or electronically. However, the following apply;

    a. The space is secure and tamper-proof
    b. A power point and network access point is provided within the space to facilitate future installation and connection of an electronic 'real-time' system or internet access point.
    c. The space is located in a part of the building that is accessible to all building users, ideally in a main reception or lobby area, with adequate signage at its point of use and throughout appropriate areas of the development indicating its purpose and location/existence.

Compliance Notes	
New Build	There are no additional or different criteria to those outlined above specific to new-build projects.
Refurbishment	There are no additional or different criteria to those outlined above specific to refurbishment projects.
Extensions to existing buildings	There are no additional or different criteria to those outlined above specific to the assessment of extensions to existing buildings.
Fit Out Only	There are no additional or different criteria to those outlined above specific to fit out-only assessments.
Schools, sixth form and further education colleges	This issue is not applicable for the assessment of pre-schools, schools, sixth form and further education colleges.
Building users	Where the term *building users* is referenced this refers to staff, students and visitors. For buildings whose access is restricted to staff only (including PhD and Post-Doctoral academics), this issue does not need to be assessed.
Location of 'Travel Information Point'	The information point does not necessarily have to be situated internally. If sited externally however, it must be covered, in an area that is readily accessible to building users and within close proximity of the main entrance or pedestrian routes to and from local public transport nodes, parking areas and the main building entrance.

Existing travel information facilities	The credit can be awarded where there is an existing maintained *real-time information system* within 250m of the assessed development's main entrance via a safe pedestrian route (not '*as the crow flies'*).

Schedule of Evidence Required

Req.	Design Stage	Post Construction Stage
1&2	Design plan and/or a copy of the relevant specification clause(s) confirming: • Location and scope of the travel information point/facility	Assessor's building/site inspection and photographic evidence confirming compliant installation of the travel information point(s).

Additional Information

Relevant definitions

Real time passenger information system: An electronic system that provides up-to-date, i.e. real time, information on local public transport service(s). Primarily how close the service is running to time and when it is due at a node/interchange and, potentially, incidents that affect service operations, platform changes etc.

Issue ID	Issue Title	No. of credits available	Minimum standards
Tra 8	Deliveries and Manoeuvring	1	No

Aim

To ensure that safety is maintained and disruption due to delivery vehicles minimised through well-planned layout and access to the site.

Assessment Criteria

The following demonstrates compliance:

1. Parking and turning areas are designed for simple manoeuvring according to the type of delivery vehicle likely to access the site, thus avoiding the need for repeated shunting.

2. There is a separate parking area for waiting goods vehicles, away from the manoeuvring area and staff/visitor car parking.

3. Delivery areas are not accessed through parking areas and do not cross or share pedestrian and cyclist routes and other outside amenity areas accessible to building users and general public.

4. There is a dedicated space for the storage of refuse skips and pallets away from the delivery vehicle manoeuvring area and staff/visitor car parking.

Compliance Notes	
New Build	There are no additional or different criteria to those outlined above specific to new-build projects.
Refurbishment	There are no additional or different criteria to those outlined above specific to refurbishment projects.
Extensions to existing buildings	There are no additional or different criteria to those outlined above specific to the assessment of extensions to existing buildings.
Fit Out Only	There are no additional or different criteria to those outlined above specific to fit out-only assessments.
Small buildings/units	For the purpose of assessing this issue, smaller buildings/units (i.e. <200m^2) and developments where heavy goods vehicles are unlikely to access the site, the criteria for the manoeuvring area need be sized only to accommodate large delivery vans (i.e. transit type or similar). Also, requirement 3 '*delivery areas are not be accessed through parking areas'* can be relaxed for smaller sites if it can be confirmed that all deliveries to the building will be made by small vans and not heavy goods vehicles.
No vehicle delivery and manoeuvring areas	This BREEAM issue is not assessed where the development does not have a vehicle delivery and manoeuvring area. In such cases this issue will be filtered from the list of relevant credits by the assessor's spreadsheet tool.

Schedule of Evidence Required

Req.	Design Stage	Post Construction Stage
1-4	Proposed site plan clearly showing: • Manoeuvring area • Delivery vehicle waiting area • Designated area for skips/pallets Appropriate documentation or correspondence from the design team confirming: • Likely vehicle delivery type that will access the development. • Predicted frequency of deliveries	Assessor's building/site inspection and photographic evidence confirming the existence of a compliant delivery area.

Additional Information

Relevant definitions
None.

The Metric Handbook[75] contains details of typical delivery/freight vehicle sizes and turning circles.

8.0 Water

Issue ID	Issue Title	No. of credits available	Minimum standards
Wat 1	Water Consumption	3	Yes

Aim

To minimise the consumption of potable water in sanitary applications by encouraging the use of low water use fittings.

Assessment Criteria

The following demonstrates compliance:

Pre-Schools, Schools & Sixth Form colleges

1. The credits are awarded as follows:

    a. One credit where consumption is 4.5 - 5.5m^3 per person per year
    b. Two credits where consumption is 1.5 - 4.4 m^3 per person per year
    c. Three credits where consumption is <1.5 m^3 per person per year

2. To determine the water consumption figure for the assessed building, determine the *effective flush volumes* and flow rates for the following installed sanitary fittings and enter this data into the BREEAM Water Calculator Tool:

    a. WCs
    b. Urinals
    c. Taps
    d. Showers

    Exclude kitchen taps, cleaners' sinks and external taps.

3. If any rainwater collection or greywater recycling systems are specified for the purpose of meeting WC/urinal flushing demand, determine the following information (as appropriate to system type):

    a. Annual rainfall for the site location (mm)
    b. Rainwater catchment area (m^2)
    c. Catchment type e.g. pitched roof, flat roof
    d. Rainwater filter co-efficient
    e. Rainwater collection tank capacity
    f. Percentage of tap and shower water collected and used for WC/urinal flushing.
    g. Percentage of building's WC/urinals using greywater to meet flushing demand.

Further & Higher Education Colleges

First credit

1. All WCs have an *effective flush volume* of 4.5 litres or less.

2. Where dual flush toilets are specified they have guidance or symbols instructing the user on the appropriate operation of the flushing device. This can be provided on the flush control buttons, cistern, or nearby for a group of cisterns.

Second credit

3. The second credit can be awarded for **EITHER** of the following:

    a. All WCs have an *effective flush volume* of 3 litres or less **OR**
    b. All WCs are compliant with the criteria for the first credit and fitted with a *delayed action inlet valve*.

4. Where dual flush toilets are specified they have guidance or symbols instructing the user on the appropriate operation of the flushing device. This can be provided on the flush control buttons, cistern, or nearby for a group of cisterns.

Third credit

5. Of the following, the two that offer the greatest possible reduction in annual water consumption have been specified:

    a. All taps (excluding those specifically listed as *Excluded Fittings* in the Compliance Notes) have a maximum flow rate less than 6 litres/min for a water pressure of 0.3MPa and are one of, or a combination of, the following types:

        - Timed automatic shut-off taps e.g. push taps
        - Electronic sensor taps
        - Low flow screw-down/lever taps
        - Spray taps

    b. All showers, where specified, have a measured flow rate that does not exceed 9 litres per minute for a water pressure of 0.3MPa, assuming a delivered water temperature of 37ºC.

    c. All urinals are either:

        - Fitted with individual presence detectors that operate the flushing control after each use.
        - Ultra low flush or waterless urinals.

Compliance Notes	
New Build	There are no additional or different criteria to those outlined above specific to new build projects.
Refurbishment	There are no additional or different criteria to those outlined above specific to refurbishment projects.
Extensions to existing buildings	Where a project under assessment consists solely of an extension, and no new sanitary facilities are to be provided, facilities provided in the existing building should be assessed (this refers to the nearest accessible facilities for each gender/function, where appropriate, i.e. those likely to be used by the occupants and visitors in the extension building).

Fit Out only	There are no additional or different criteria to those outlined above specific to fit out-only assessments.
No Fittings specified	Where no sanitary fittings are to be installed in the building being assessed then the credit must be assessed on the basis of the nearest accessible facilities likely to be used by the occupants of the assessed building.
Third credit	Awarding the third credit is not dependent on the first or second credits having been achieved.
Other water-saving features	If the development is using alternative or innovative water-saving features other than those listed in the criteria, and the client wishes to consider this as one of the two fittings with the greatest water saving potential, then the assessor must contact BRE for approval prior to awarding a credit. Alternatively, consider applying for it to be recognised as an additional innovation credit.
Showers with a range of flow rates	Where a shower head delivers a range of flow rates, the average or typical flow rate should be used.
Excluded fittings	The following fittings, where specified, can be excluded from the scope of this issue (for operational purpose): • Kitchen taps • Cleaners' sink taps • External taps • Process taps in laboratory areas but not bench taps (which should be included) • Scrub-up taps • Decontamination showers • Taps dedicated to H&S, e.g. eye washing
Swimming / Hydrotherapy Pools	Where the assessment is of a building containing a swimming pool or hydrotherapy pools, the criteria of this issue, with respect to showers, are also applicable to all 'pre-swim-showers, in addition to all 'post-swim' showers within the wet change facilities.

Schedule of Evidence Required

Req.	Design Stage	Post Construction Stage
Pre-Schools, Schools & Sixth Form Colleges		
1-3	A copy of the relevant section of the M&E specification and/or manufacturer's details confirming: • Technical specification of sanitary fittings and controls to be installed • Location, size and details of any rainwater and greywater collection system. Design plan showing the location within the building of the sanitary and grey/rainwater collection facilities. A copy of the output from the BREEAM Water Calculator tool.	Assessor's building/site inspection report and photographs or purchase orders confirming: • The type and amount of fittings and controls installed. Manufacturer's/installer's details for installed fittings/controls confirming: • Their technical specification • The rainwater collection area and capacity of rainwater or greywater systems (where specified). Where changes have occurred since design stage assessment, a revised copy of the output from the Water Consumption Calculator tool.
Further & Higher Education Colleges		

All	A copy of the relevant section of the M&E specification and/or manufacturer's details confirming: • Technical specification for sanitary fittings (flow rate) and controls to be installed. Design plan showing the location within the building of the sanitary facilities.	Assessor's building/site inspection report and photographs or purchase orders confirming: • The type and amount of fittings and controls installed. Manufacturer's details for installed fittings/controls confirming the technical specification.

Additional Information

Relevant definitions

Greywater recycling: The appropriate collection, treatment and storage of used shower, bath and tap water for use instead of potable water in WC flushing.

Nett lettable area (NLA): This is the gross internal area less common areas and ancillary spaces (corridors, plant room, toilet blocks etc). NLA is often quoted in square feet; 1 square metre is 10.76 square feet.

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

Rainwater recycling: The appropriate collection and storage of rain from hard outdoor surfaces for use instead of potable water in WC flushing.

Delayed action inlet valve: Devices that prevent water entering the WC cistern until it has completely emptied, enabling a precise volume of water to be discharged independent of water pressure.

Effective flush volume: The volume of water needed to clear the toilet pan and transport any content far enough to avoid blocking the drain.

Dual Flush Cisterns: Devices that have the facility to provide lower flush volume for liquids and higher flush volume for solids and paper.

Calculating the effective flushing volume of dual flush toilets: For dual flush WCs the ratio *full flush:reduced flush* is taken to be 1:3 for non-domestic buildings. The effective flush volume can therefore be calculated as follows, using a 6/4 litre dual flush volume WC:

((6 Litre*1) + (4 Litre*3))/4

= 4.5 Litre effective flushing volume

Water Calculation Tool (Pre-Schools, Schools & Sixth Form Colleges only)
BREEAM's Water Calculation Tool is used to estimate water consumption (m^3 per person per year) for the building based on the installed sanitary fittings. Where a type of appliance or fitting is not specified, assume the following building regulations (Water Supply (Water Fittings) Regulations 1999[80]) or default fittings:

- Regular taps for wash hand basins (12 litres/minute)
- High flow shower (14 litres/minute)
- WC (6 litre cistern)
- Cistern serving single urinal = 10 litres per use (flush).
- Cistern serving two or more urinals = 7.5 litres per use (flush).
- Urinals with manual flush on each stall or automatic pressure flushing valves = 1.5 litres per use.

When entering flow rates for wash hand basin taps into the Water Calculation Tool, the flow rate should be taken as 2/3 of the maximum flow rate quoted by the manufacturer. The maximum flow rate can be the flow rate achieved with a flow restrictor i.e. where flow restrictors are specified, 2/3 of the flow rate with the restrictor installed should be taken.

Where specified taps have a break point at the mid range of the flow (often referred to as 'click taps' or two stage mixer taps), the flow rate should be taken as the maximum flow rate quoted by the manufacturer of the lower range before the water break. This is typically 50 per cent of the flow rate, however this should not be assumed and manufacturer's information must always be used.

The water calculator determines water consumption for the assessed building using a default occupancy figure of 1 person per $10m^2$ of nett lettable area. Even for instances where building occupancy is known, the default occupancy figure must be used to ensure a consistent assessment.

The tool allows the assessor to account for any rainwater or greywater collection by offsetting the contribution from these sources from the total estimated water consumption figure. Please note, the calculator is a compliance tool and should not be used to size or specify rainwater and greywater recycling systems.

Product Certification of Low Flush WCs

Product certification schemes provide specifiers and clients with greater assurance of manufacturers' claim regarding the performance of the actual flush volume of their products and therefore the potential water savings of different products. At present BREEAM does not require that the flushing volume of WCs (or any other water-consuming device) meet an approved standard to gain BREEAM credits.

BRE Global currently operates a certification and listing scheme for low flush WCs and products certified to this standard will be listed on www.greenbooklive.com. Green Book Live is a free-to-view online database designed to assist specifiers and end users in the identification of environmentally beneficial products and services. If you would like to know more information about the Certification and Listing of Low Flush WCs Scheme please contact BRE Global at enquiries@breglobal.com

.

Issue ID	Issue Title	No. of credits available	Minimum standards
Wat 2	Water Meter	1	Yes

Aim

To ensure water consumption can be monitored and managed and therefore encourage reductions in water consumption.

Assessment Criteria

The following demonstrates compliance:

1. The specification of a water meter on the mains water supply to each building; this includes instances where water is supplied via a borehole or other private source.

2. The water meter has a pulsed output to enable connection to a Building Management System (BMS) for the monitoring of water consumption.

3. If there is a swimming pool on site within the scope of the assessment, the building housing it must be covered by a separate meter in accordance with the above criteria. The changing facilities (including showers, toilets etc) housed in this building should also be covered by this meter.

4. Where there is more than one building on the site within the scope of the assessment, each building must be separately metered in accordance with the above criteria.

5. If there is 'plumbed-in' laboratory process equipment, a separate water meter must be specified on any process or cooling loop.

Exemplary level criteria
The following outlines the exemplary level criteria to achieve an *innovation credit* for this BREEAM issue:

1. Where sub meters are fitted to allow the metering of individual water-consuming plant or building areas, where demand in such areas will be equal to or greater than of 10% of the total water demand of the building (see also compliance note).

2. Each sub meter has a pulsed output to enable connection to a Building Management System (BMS) for the monitoring of water consumption.

Compliance Notes	
New Build	There are no additional or different criteria to those outlined above specific to new build projects.
Refurbishment	There are no additional or different criteria to those outlined above specific to refurbishment projects.
Extensions to existing buildings	If no new water supply is being installed because occupants of the extended building will use the facilities in, and therefore water supply to the existing building, then the issue should be assessed on the basis of whether a compliant water meter is installed on the existing supply.

Fit Out Only	There are no additional or different criteria to those outlined above specific to Fit Out-only assessments.
No water supply to the building/unit	If there is no water supply to the building during operation because there will be no installed water-consuming fittings in the building, then the issue must be assessed on the basis of the water supply to the nearest accessible building with such facilities, likely to be used by the future occupants of the assessed building.
Exemplary level criteria	It is widely accepted that water usage can be decreased by how water is consumed by building users. If there are only small water consuming units used within the building such as singular toilets, small kitchen etc. It is unlikely there will be an opportunity to reduce water consumption by increased water management. And therefore there will be no benefit to installing a sub-meter; in such instances the exemplary credit is not available. Compliance with the criteria can also be demonstrated where the water metering/monitoring equipment is integral to the water consuming plant, as oppose to a sub meter on the water supply to the plant.

Schedule of Evidence Required

Req.	Design Stage	Post Construction Stage
All	A copy of the specification clause confirming: • The specification and type of water meter(s). Design plan(s) showing: • Location of the water meter(s) in each assessed building/unit.	Assessor's building/site inspection report and photographs or 'as built' drawings confirming: • The location of the water meter(s). Manufacturer's details confirming: • The specification of a pulsed output on the installed meter(s). If connected to a BMS, the assessor's site inspection confirming live meter readings can be used in lieu of manufacturer's details confirming specification of a pulsed output.

Additional Information

Relevant definitions
None.

The requirement for a pulsed output has been included to encourage the use of meters capable of transmitting (by wire or wirelessly) a continuous or pulsed signal with water management information such as total water consumed or flow rate to a Building Management System. This allows demand patterns on water systems to be monitored and evaluated over time. A significant increase in demand may indicate the presence of a leak or inappropriate or unexpected water consumption.

Issue ID	Issue Title	No. of credits available	Minimum standards
Wat 3	Major Leak Detection	1	No

Aim

To reduce the impact of major water leaks that may otherwise go undetected.

Assessment Criteria

The following demonstrates compliance:

1. A leak detection system capable of detecting major leaks on the water supply has been installed. The system must cover all mains water supply between and within the building and the site boundary.

2. The leak detection system is:

    a. Audible when activated
    b. Activated when the flow of water passes through the water meter/data logger at a flow rate above a pre-set maximum for a pre-set period of time
    c. Able to identify different flow and therefore leakage rates, e.g. continuous, high and/or low level, over set time periods
    d. Programmable to suit the owner/occupiers' water consumption criteria
    e. Where applicable, designed to avoid false alarms caused by normal operation of large water-consuming plant such as chillers.

Compliance Notes	
New Build	There are no additional or different criteria to those outlined above specific to new build projects.
Refurbishment	There are no additional or different criteria to those outlined above specific to refurbishment projects.
Extensions to existing buildings	If the water supply to the new extension is via the existing building then the water supply to the existing building must be assessed against the criteria of this issue.
Fit Out Only	There are no additional or different criteria to those outlined above specific to Fit Out-only assessments.
Ancillary or multiple buildings	The criteria apply to the water supply to all buildings falling within the scope of the assessment.
Mains supply shut-off	It is not a requirement of this issue that the leak detection system shut off the water supply when the alarm is triggered.
No water supply to the building/unit	If there is no water supply to the building because there will be no installed water-consuming fittings in the building, then the issue must be assessed on the basis of the water supply to the nearest accessible building with such facilities, likely to be used by the future occupants of the assessed building.

Leakage Rates	This issue does not specify what the high and low level leakage rates should be; however, the equipment installed must have the flexibility to distinguish between different flow rates to enable it to be programmed to suit the owner/occupier's usage patterns.
Pre-set flow rates	Pre-set flow rates and time periods will vary depending on the building type and usage.
System criteria	It is anticipated that this credit will usually be achieved by installing a system which detects higher than normal flow rates at meters and/or sub-meters. It does not require a system that would directly detect water leakage along part or the whole length of the water supply system.
Water authority meters	Where there is a water authority meter at the site/building boundary, it may be necessary to install a separate flow meter to detect leaks; however, if the water authority agrees to some form of leak detection being installed on their meter, this would also be acceptable.

Schedule of Evidence Required

Req.	Design Stage	Post Construction Stage
1&2	A copy of the specification clause confirming: • Scope and performance criteria of leak detection system. **AND/OR** Manufacturer's details confirming: • The technical specification the specified systems.	Assessor's building/site inspection and photographic evidence confirming: • The installation and operation of the leak detection system. • The pre-set variables of the system for triggering the alarm and the flexibility of the building occupier to vary these*. * This can be confirmed in a letter from the contractor/installer to the assessor.

Additional Information

Relevant definitions
None.

Issue ID	Issue Title	No. of credits available	Minimum standards
Wat 4	Sanitary Supply Shut Off	1	No

Aim

To reduce the risk of minor leaks in toilet facilities.

Assessment Criteria

The following demonstrates compliance:

1. Solenoid valves are installed on the water supply to each toilet area in the building and the flow of water through that supply is controlled by a link to either:

    - Infra-red movement detectors within each toilet facility **OR**
    - Sensors or switches placed at or on entry doors to each facility.

Compliance Notes	
New Build	There are no additional or different criteria to those outlined above specific to new build projects.
Refurbishment	There are no additional or different criteria to those outlined above specific to refurbishment projects.
Extensions to existing buildings	If the facilities are within the existing building then it is those existing facilities that must be assessed against the criteria of this issue.
Fit Out Only	There are no additional or different criteria to those outlined above specific to fit out-only assessments.
No toilet facilities in the assessed building	If no toilet areas exist in the building then the assessment criteria must be assessed on the basis of the nearest accessible building with such facilities likely to be used by the occupants of the assessed building.
Shut-off systems	Shut-off systems may control combined toilet areas, such as male and female toilets within a core.
Proximity detection criteria	Proximity detection shut-off is not required for each individual sanitary appliance to achieve the credit. The requirement is for the water supply to be isolated for each toilet block on a floor when not being used by the occupants.
Single WCs	The criteria for this issue apply to facilities with a single WC (potentially within smaller or low occupancy buildings). In these instances shut-off can be provided via the same switch that controls the lighting (whether proximity detection or a manual switch).

Schedule of Evidence Required

Req.	Design Stage	Post Construction Stage

1	A copy of the specification clause confirming: • The specification of shut-off valves • The controls for the shut-off valves. A design plan showing: • The location of the toilet facilities.	Assessor's building/site inspection and photographic evidence confirming: • The location and installation of proximity detection controls. **AND** 'As built' drawings showing: • The specification of shut-off valves

Additional Information

Relevant definitions

Solenoid valve: An electrically operated shut-off device that controls the flow of water in pipes.

Volume controller: An automatic control device to turn off the water supply once a maximum preset volume is reached.

Programmed time controller: An automatic time switch device to switch the water supply on and/or off at predetermined times.

Light fittings in toilets are often controlled by proximity detection by IR movement detectors or sensors placed at entry doors (the latter can be less accurate as more than one person can enter or depart in the opening of one door). The sensors used to control the lighting can also be linked to a solenoid valve in the cold water supply. This will then act as a proximity detection system.

Small water leaks can result in significant losses over time, increasing costs as well as causing damage. There is a significant risk of leaks going undetected, particularly as toilet accommodation is often unoccupied for long periods. A proximity detection shut-off system prevents waste water from minor leaks by shutting off the water supply when toilet accommodation is not occupied.

Valves in cisterns supplying urinals and WCs are especially prone to failure, leading to wastage of water via the overflow. Whilst leakage from any valve is variable, a typical value for a leaking valve toilet might be 4 litres/day.

Issue ID	Issue Title	No. of credits available	Minimum standards
Wat 5	Water Recycling	1	No

Aim

To encourage the collection and re-use of waste water or rainwater to meet toilet flushing needs and reduce the demand for potable fresh water.

Assessment Criteria

The following demonstrates compliance:

Where **one** of the following water recycling strategies has been implemented:

1. Where a rainwater collection tank has been installed and the tank is sized to collect at least 50% of **EITHER:**

    a. The total predicted rainwater run-off from the roof catchment area for the *defined period of collection*. **OR**
    b. The rainwater run-off required to meet the total predicted flushing demand for the *defined period of collection*.

2. Waste water from wash hand basins and showers is collected from ≥80% of fittings and recycled to meet part (minimum of 10%) or the total of WC/urinal flushing demand within the building(s).

3. For higher education buildings with laboratories, at least 80% of waste water from processes or water treatment (e.g. from water treatment serving labs where permitted by regulation) is collected and recycled to meet part (minimum of 10%) or the total of WC/urinal flushing demand within the building(s).

4. A combination of rainwater collection, greywater and waste water from processes (higher education only) or water treatment that meets at least 50% of **EITHER:**

    a. The total predicted toilet and urinal flushing demand for the *defined period of collection* **OR**
    b. The total predicted toilet and urinal flushing demand for the *defined period of collection* and (where specified) irrigation of planting and landscaping.

Compliance Notes	
New Build	There are no additional or different criteria to those outlined above specific to new build projects.
Refurbishment	There are no additional or different criteria to those outlined above specific to refurbishment projects.
Extensions to existing buildings	If the assessment is of the new extension only, then the roof catchment area can be taken as the roof area of the extended building. If feasible however, the total roof area of the new extension and existing building can be used. If the assessment is of the new build extension and existing building i.e. whole building, then the roof catchment area is taken as the whole roof area of the building.

Fit Out Only	There are no additional or different criteria to those outlined above specific to Fit Out-only assessments.
Rainwater collection tank size	Of the two options available for demonstrating compliance, it is the option with the lesser of the two figures (litres) that should be specified and therefore used to demonstrate compliance. For example it would not be expected to size a system that collected significantly more rainwater over the defined period than was required to meet flushing demand in the building over the same period, unless the collection system is being used to meet landscape irrigation demand or forms part of a storm water management strategy.
Greywater system	No BREEAM criteria have been set in terms of the period of collection that the tank should be sized to meet. Where a greywater collection system is specified, the size of the tank should be appropriate to the building occupancy and frequency of the facilities usage, bearing in mind that greywater tanks have a typical maximum retention period of 24 hours.
Calculation criteria	See additional guidance for an example of calculating compliance with the assessment criteria.
Run-off from paved areas	Run-off from paved areas can also be collected and included in the calculation. Where the run-off is collected from part roof, part paved areas, the total catchment area must be at least equivalent to the plan area of the roof.
Using rainwater to meet irrigation and other process demands	Using rainwater collection for WC/urinal flushing is the first priority. Where this demand is met, additional rainwater resources can be used to meet water demand for irrigation or building/operational processes.
Waste Water from processes	Process related waste water in higher education buildings can be counted towards the achievement of the credit only where the process that produces the waste water is an integral part of the building and its use/operation.
Calculating total predicted flushing demand	Total predicted flushing demand can be estimated by the design team on the basis of the following variables: • Number of building users (staff and visitors/students/users as applicable) • Effective flush volume of WCs/urinals • Estimated number* of WC/urinal uses per person per day (multiplied by the defined period of collection) * For staff use, unless other data is available, assume 1.3 WC uses per person per day and 2 urinal uses per person per day (assume that only 50% of the building occupants will use urinals).

Schedule of Evidence Required

Req.	Design Stage	Post Construction Stage
All	A copy of the specification clause confirming: • Type of collection system specified. • WC, urinal, taps and shower specification (where appropriate). • The type of system that generates and recycles process related waste water (where appropriate). Design team calculations for the *defined period of collection* demonstrating (where appropriate): • Rainwater yield for the catchment area (mm) • Predicted WC/urinal flushing demand • Estimated potential for waste water collection from taps/showers/other process (where applicable). • Size (litres) of the rainwater/greywater collection tank specified.	Assessor's building/site inspection and photographic evidence confirming: • The installation of the collection system. Where changes have occurred since design stage assessment, a revised copy of the technical specification and sizing calculations for the installed system.

Additional Information

Relevant definitions

Defined period of collection: For the purpose of assessing this Issue the defined period of collection is 18 days. This is equivalent to approximately 5% of annual rainfall yield.

Potable water: Defined as drinkable and/or mains supplied water. This definition includes water obtained by borehole abstraction and water sourced from rivers, mountain streams, lakes etc.

Catchment area: An area that catches rainfall and delivers it to a collection tank for re-use.

Greywater: Waste water from taps, showers and laundries.

Calculating compliance

The following formula can be used to calculate the volume of collectable rainwater for the assessed building's catchment area for the defined period of collection:

$\sum (A_{RF} \times C \times R_{co\text{-}ef} \times F_{co\text{-}ef} \times D_{col})$

Where:

A_{RF} = Annual rainfall for the site location (mm)
C = Rainwater catchment area (m^2)
$R_{co\text{-}ef}$ = Run-off co-efficient
$F_{co\text{-}ef}$ = Filter co-efficient.
D_{col} = Defined period of collection: 18 days/365 days = 0.05

Annual rainfall: The local EA, SEPA, EHS office or the Met Office should be able to supply rainfall data.

Run-off co-efficient: A coefficient is used to adjust the tank size calculation to allow for the fact that not every drop of rain that falls within the catchment area will be collected by the tank. Drainage co-efficient is dependent on the type of roof specified for the building, flat roofs having a lower co-efficient. Below are some typical co-efficient factors:

Roof type	Run-off co-efficient
Pitched roof tiles	0.75 - 0.9
Flat roof smooth tiles	0.5
Flat roof with gravel layer	0.4 – 0.5

Filter co-efficient: Not all the water that drains from the roof down the gutters will reach the holding tank; the filter co-efficient accounts for this. Most manufacturers/installers of systems will recommend a filter co-efficient of 90% i.e. 0.9.

Drainage and filter co-efficiencies can be found in CIRIA guidance[81], though these should be in the design team's sizing calculations.

Example calculation:

Average annual rainfall for the site location (mm)	757mm
Roof catchment area (m^2)	3,500m^2
Drainage co-efficient (tiled pitched roof)	0.8
Filter co-efficient.	0.9
Defined period of collection	0.05
Volume of rainwater for the defined period of collection	95,382 Litres

An installed rainwater collection tank with a capacity of 50,000 litres would therefore collect 52.4% of the total predicted rainwater run-off from the roof catchment area for the defined period of collection.

Design issues

BS4800:1989 *Schedule of paint colours for building purposes*. This BS covers the need to have pipework in standardised colours to avoid cross contamination and sets colours for rainwater and greywater system pipes' flow and return.

BS1710:1984 *Specification for identification of pipelines and services*. This BS covers the identifying marks that should be placed on pipes containing different substances, including greywater pipes, and references the colours in the above BS.

Issue ID	Issue Title	No. of credits available	Minimum standards
Wat 6	Irrigation Systems	1	No

Aim

To reduce the consumption of potable water for ornamental planting and landscape irrigation.

Assessment Criteria

The following demonstrates compliance:

1. Where the irrigation method specified for internal or external planting and/or landscaping complies with **ANY ONE** of the following:

    a. Drip feed subsurface irrigation that incorporates soil moisture sensors. The irrigation control should be zoned to permit variable irrigation to different planting assemblages.
    b. Reclaimed water from a rainwater or greywater system.
    c. External landscaping and planting that relies solely on precipitation, during all seasons of the year.
    d. The only planting specified is restricted to species that thrive in hot and dry conditions.
    e. Where no dedicated, mains-supplied irrigation systems (including pop-up sprinklers and hoses) are specified, and planting will rely solely on manual watering by building occupier or landlord.

2. Where a sub surface drip feed irrigation system is installed for external areas, a rainstat must also be installed to prevent automatic irrigation of the planting and the landscape during periods of rainfall.

Compliance Notes	
New Build	There are no additional or different criteria to those outlined above specific to new build projects.
Refurbishment	There are no additional or different criteria to those outlined above specific to refurbishment projects.
Extensions to existing buildings	There are no additional or different criteria to those outlined above specific to the assessment of extensions to existing buildings.
Fit Out Only	There are no additional or different criteria to those outlined above specific to fit out-only assessments.
No landscaped areas	This issue does not apply where there are no landscaped areas within the construction zone of the assessed building. In such instances the BREEAM assessor's spreadsheet tool will filter the issue from the list of applicable issues.

Schedule of Evidence Required

Req.	Design Stage	Post Construction Stage
1&2	Design team confirmation via assessment meeting minutes, letter or email confirming the irrigation strategy for the site **AND** Proposed site plan, marked up to illustrate the scope of the irrigation specified **AND** One of the following: A copy of the specification clause confirming: • Type of irrigation system and controls. **OR** Manufacturer's information detailing: • The technical details of the specified system.	Assessor's building/site inspection and photographic evidence confirming: • The implementation of the proposed strategy. • If relevant, the installation of the specified system.

Additional Information

Relevant definitions

Construction zone: For the purpose of this issue the construction zone is defined as the site which is being developed for the BREEAM-assessed building and its external site areas i.e. the scope of the new works.

9.0 Materials

Issue ID	Issue Title	No. of credits available	Minimum standards
Mat 1	Materials Specification (Major Building Elements)	6	No

Aim

To recognise and encourage the use of construction materials with a low environmental impact over the full life cycle of the building.

Assessment Criteria

The following demonstrates compliance:

1. The Green Guide rating for the specifications for the following building elements must be determined and entered in to the BREEAM assessor's *Mat 1 Calculator*. Green Guide ratings for the specification(s) making-up each element can be found at: www.thegreenguide.org.uk

Building Element	Applicable elements to assessment stage	
	New build & Major Refurbishment	Fit Out
External Walls	**P**	N/A
Windows	**P**	N/A
Roof	**P**	N/A
Upper Floor Slabs	**P**	N/A
Internal Walls	**P**	**P**
Floor Finishes / Coverings	**P**	**P**

The calculator awards points for each applicable element according to its Green Guide rating as follows:

Green Guide Rating	Points/element
A+	3
A	2
B	1
C	0.5
D	0.25
E	0

The calculator translates the total number of points in to BREEAM credits as follows:

New build & Refurbishments	
Total Points	**Credits**
2	1
5	2
8	3
10	4
12	5
14	6

Fit Out assessments	
Total Points	**Credits**
Floor finishes and Internal walls	
2	1
4	2

Note: Also refer to the guidance concerning the Mat 1 calculator tool in the *Additional Information* section of this issue for further explanation of how the tool awards the available credits.

Exemplary level criteria
The following outlines the exemplary level criteria to achieve an *innovation credit* for this BREEAM issue.

1. One exemplary BREEAM credit can be awarded as follows:

    a. Where assessing four or more applicable building elements, the building achieves at least two points additional to the total points required to achieve maximum credits under the standard BREEAM criteria.
    b. Where assessing fewer than four applicable building elements, the building achieves at least one point additional to the total points required to achieve maximum credits under the standard BREEAM criteria.

Compliance Notes	
New Build	There are no additional or different criteria to those outlined above specific to new-build projects.
Refurbishment	For each element that is reused in situ, BREEAM allocates an 'A+' rating and these elements should also be included in the 'A+' rated area in the MW1 calculator. New elements specified as part of a refurbishment project, e.g. windows, must be assessed as outlined above.
Extensions to existing buildings	Any applicable new-build elements, forming part of the new extension, must be assessed as outlined above. If the existing building forms part of the scope of the assessment, then any existing applicable element that is reused in situ achieves an 'A+' rating, as outlined above for refurbishments.
Fit Out Only	There are no additional or different criteria to those outlined above specific to Fit-Out assessments.
Green Guide Online	Refer to the Additional Information section below for guidance on using the online Green Guide to Specification and accessing the appropriate ratings for the assessed elements.
Element consisting of more than one specification	Where more than one specification is present for a given element, the rating and area for each specification should be entered into the tool and an average points score is calculated (by area).

Finding exact Green Guide Ratings	Whilst exact matches in specifications are not always found, it should be possible to identify a similar specification and use its rating for the purposes of assessment (also see note below '*No Green Guide rating match*').
No Green Guide rating match	Where a Green Guide rating cannot be found for a specification BREEAM Assessors can use the *online Green Guide calculator* to determine a bespoke Green Guide rating for the specification. Licensed BREEAM Assessors can access the calculator via www.thegreenguide.org.uk. If a required component is not present via the online calculator, The BREEAM Assessor will need to submit a standard Bespoke Green Guide Query proforma, from which BRE Global will calculate the rating and confirm the result to the Assessor.
New elements containing reused materials	If a new element is specified e.g. external wall, and part of that element includes a reused material e.g. reclaimed bricks, assessors should seek guidance from BRE on the appropriate rating.
Mixed use developments	Where the assessment covers only some of the floors in the building, the roof must still be assessed as it is protecting the assessed building below. If the roof is directly above domestic accommodation (e.g. flats), the equivalent domestic Green Guide rating for the roof must be used as opposed to the ratings for non-domestic roofs. Roof areas not protecting parts of the assessed building/space can be omitted from the assessment.
Single storey buildings and upper floors	Where the assessed building is a single storey building and therefore has no upper floors, the upper floor element does not need to be assessed. In such instances the BREEAM assessor's *Mat 1 Calculator* will re-calculate the requirement and award the available credits in accordance with the Green Guide ratings for the remaining applicable elements.
Exemplary level criteria requirements where building contains no upper floor	Where there is no upper floor slab in the building the Mat 1 calculator tool adjusts the points to credit benchmark scale. As such, to achieve six credits 11.67 points must be achieved. In accordance with requirement 1b of the Exemplary level criteria 13.67 points must be achieved to award the additional credit for compliance with the Exemplary Level Criteria. The maximum number of points that can be achieved where there is no upper floor slab, i.e. where all remaining elements achieve an A+ Green Guide rating, is 15 points.
Where integral insulated cold storage units form a part of the building fabric	Please refer to the Additional Information section for guidance on accessing this issue for buildings with integral cold storage units, where the walls, floor and ceiling of that unit form a part of the buildings fabric.

Schedule of Evidence Required

Req.	Design Stage	Post Construction Stage
1 & Exemp. level req.	Specification confirming: • A detailed description of each applicable element and its constituent materials. Design drawings or specification detailing: • Location and area (m^2) of each applicable element. A copy of the output from the Mat 1 Calculator, including Green Guide rating and element number* for each specification assessed. * Element numbers may change from time-to-time due to updates in the green guide	Assessor's building/site inspection and photographic evidence confirming: • Element in-situ (where possible) **AND** As built drawings and, where relevant, written design team confirmation of any changes to materials specification.

	data. As a result assessors should keep a note of the element numbers they use to give Green Guide rating advice on BREEAM assessments for auditing purposes.	

Additional Information

Relevant definitions

Ecopoint: The Ecopoint used in the Green Guide online is single score that measures the total environmental impact of a product or process as a proportion of overall impact occurring in Europe - 100 Ecopoints is equivalent to the impact of a European Citizen. Green Guide ratings are derived by sub-dividing the range of Ecopoints/m^2 achieved by all specifications considered within a building element.

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. www.thegreenguide.org.uk

Green Guide element number: A unique BRE Global reference number given to a Green Guide rating for any particular building element type specification. Both standard Green Guide ratings and those calculated using the Online *Green Guide calculator* will have an element number.

Reused materials: are materials that can be extracted from the waste stream and used again without further processing, or with only minor processing, that does not alter the nature of the material (e.g. cleaning, cutting, fixing to other materials).

The Mat 1 Calculator: A spreadsheet-based calculator required to determine the number of credits achieved for this BREEAM issue based on each applicable element's Green Guide rating. The Mat 1 Calculator makes four adjustments to the points achieved for each specification/element assessed, as follows:

1. The first is the scoring based on the Green Guide rating; A+ =3, A=2, B=1, C=0.5, D=0.25 and E=0.
2. The second, where an element consists of several different specifications, is to weight the points achieved according to the relative area and Green Guide rating of each of the individual specifications. So if 50% of an element was A+ and 50% was C, the score would be (50%*3) + (50%*0.5) = 1.75.
3. The third is to weight based on the overall area of different elements - this is done by multiplying the area of each element by the weighted Green Guide score, adding the total for all elements and then dividing by the total area of the assessed elements. As a 20 storey office block will have a smaller roof area than floor area, so the area weighting will take this into account by giving a smaller weighting to the score for the roof than the external walls.
4. The final adjustment relates to the *Ecopoints* range for each assessed element. This adjustment ensures the environmental impact of the element in relation to the impacts of other assessed elements within the building is considered. For example; the external walls have a larger *Ecopoints* range than the internal walls, therefore, if both elements achieve the same Green Guide rating the rating of the external walls achieves a higher proportion of the overall points than the rating for the internal walls, thus recognising the relatively higher reduction possible in the environmental impact of the external walls, due to the larger *Ecopoints* range for that element.

Online Green Guide calculator: BRE Global have created the *Green Guide Calculator* to enable BREEAM and CSH assessors to quickly and efficiently generate Green Guide ratings for a significant proportion of specifications not listed in the Green Guide Online. The *Green Guide Calculator* database is based on the components currently used to create specifications within the Green Guide Online.

These components can be selected and combined to generate instant Green Guide ratings for a multitude of different specifications.

To access the Green Guide Calculator, you must be a licensed BREEAM/EcoHomes/Code for Sustainable Homes Assessor. Please note that, at the time of writing, the *Green Guide Calculator* is not yet available for public use.

Using the Green Guide to Specification
The Green Guide categorises ratings by building type and element. When using the Green Guide online, (www.thegreenguide.org.uk), the main page asks the user to select a building type. To obtain the appropriate ratings for the assessed building elements, select the corresponding building type for this BREEAM scheme.

When carrying out a BREEAM assessment of a Further or Higher Education building, in most cases the Green Guide ratings listed under the '*Education*' category can be used. Alternatively, if the elemental specification of the building/space is more akin to a commercial, retail, industrial or health specification in terms of its Green Guide functional unit, then select and use the Green Guide ratings from the relevant the building type.

The following elements, for the purpose of non domestic buildings, have common Green Guide ratings irrespective of the building type:

- External walls
- Landscaping
- Windows - commercial

The user can therefore search for ratings for the above elements under any building category.

Floor finishes
On the *Green Guide online*, under each building type, are categories of flooring specifications commonly used for the key floor areas for that building type. For example, the *Retail* category contains ratings for hard and soft floor finish specifications for public access areas, based on the functional unit for that type of space.

However, any given building will normally contain several different floor areas with different wear requirements. Therefore, the BREEAM Assessor will need to refer to floor finishes under other building type categories to find the relevant specification and *Green Guide* rating for the building under assessment. For example, for 'back of house' office and corridor areas in a retail development, it will be necessary to search the floor finishes specifications and ratings under the Commercial category of the *Green Guide online*. To aid users of the *Green Guide online*, there is a diagram that will direct you to the appropriate ratings to be used for other floor areas. The diagram is found in the guidance under the *Floor Finishes* category.

Guidance for the assessment of buildings where insulated cold storage units form an integral part of the building fabric

Where the cold storage unit forms part of, or is integral to the external wall element:
As an external wall type the insulated units will be assessed in the Green Guide on the basis that it is a normal temperature building without the extra insulation, so a standard thickness of insulation will be considered. As such, the walls of the insulated unit should be treated as part of the external wall element for the assessment of this BREEAM issue.

Where the cold storage unit forms part of, or is integral to a ceiling element:
As a roof element of the insulated unit, suspended ceilings are not included within the Green Guide. Therefore, the roof of the insulated unit will be assessed as a standard construction from the deck upwards, assuming a standard thickness of insulation. As such, the roof of the insulated unit should be treated as part of the ceiling element for the assessment of this BREEAM issue.

Where the cold storage unit forms part of an internal wall element:
The insulated unit will be treated as meeting a very specific Functional Unit outside the scope of the internal wall elements listed in the Green Guide. The wall to the insulated unit should therefore be excluded from the assessment of the internal wall element.

Indoor Air Quality and the Green Guide flooring category ratings
The Green Guide Online does not cover the potential health and comfort issues associated with flooring materials and indoor air quality, which is covered in BREEAM by issue Hea 9 *Volatile Organic Compounds*.

Issue ID	Issue Title	No. of credits available	Minimum standards
Mat 2	Hard Landscaping and Boundary Protection	1	No

Aim

To recognise and encourage the specification of materials for boundary protection and external hard surfaces that have a low environmental impact, taking account of the full life cycle of materials used.

Assessment Criteria

The following demonstrates compliance:

1. Where at least 80% of all external hard landscaping and boundary protection (by area) achieves an A or A+ rating, as defined in the *Green Guide to Specification*.

   Green Guide ratings for the specification(s) of each element can be found at: www.thegreenguide.org.uk

Compliance Notes	
New Build	There are no additional or different criteria to those outlined above specific to new-build projects.
Refurbishment & existing elements	For each element that is reused in situ, BREEAM allocates an 'A+' rating. New elements specified as part of a refurbishment must be assessed as outlined above.
Extensions to existing buildings	There are no additional or different criteria to those outlined above specific to the assessment of extensions to existing buildings.
Fit Out Only	Issue not applicable for Fit Out-only assessments.
Green Guide Online	When using the Green Guide for the purpose of assessing this BREEAM issue, ratings for landscaping elements are common across all building types. The rating will therefore be the same irrespective of the building type selected via the Green Guide online.
Finding exact Green Guide Ratings	Whilst exact matches in specifications are not always found, it should be possible to identify a similar specification and use its rating for the purposes of assessment. Where no similar specification can be found, seek guidance from BRE for the appropriate rating.
Minor alteration of existing elements	Where less than 20% of the total area of existing hard landscaping and boundary protection elements are subject to minor alterations or maintenance, these elements are awarded an A+ rating for the purposes of this analysis.
No hard landscaping or boundary protection	If one of the elements is not present, e.g. boundary protection, then the credit must be assessed on the basis of the specification of the single element e.g. hard landscaping. Where the development has neither element, the credit can be awarded.
Building façade forming boundary	Any part of an external building façade (of either the assessed building or any other neighbouring building) that forms a part of the site boundary should be excluded from the assessment of this credit.

Existing natural features	Any existing or specified natural boundary protection (such as hedging or other living barrier) should be awarded with an A+ rating for the purposes of this analysis.
Scope of hard landscaping	For the purpose of assessment, hard landscaping includes parking areas, but excludes access/approach roads and designated vehicle manoeuvring areas.

Schedule of Evidence Required

Req.	Design Stage	PCR Stage
1	Specification confirming: • A detailed description of each applicable element and its constituent materials. Design drawings or specification detailing: • Location and area (m^2) of each applicable element. The Green Guide rating and *element number* for the assessed specifications.	Assessor's building/site inspection and photographic evidence confirming: • Element in-situ (where possible) As built drawings/calculations. Written confirmation from the design team or contractor of any changes to the specification.

Additional Information

Relevant definitions

Green Guide: See Mat 1.

Green Guide Element Number: See Mat 1

Issue ID	Issue Title	No. of credits available	Minimum standards
Mat 3	Re-Use of Facade	1	No

Aim

To recognise and encourage the in-situ reuse of existing building façades.

Assessment Criteria

The following demonstrates compliance:

1. At least 50% of the total final building façade (by area) is reused.

2. At least 80% of the reused façade (by mass) comprises in-situ reused material.

3. Where an existing building is being reused and/or extended and the function/purpose of the new building will be the same as that which the existing building was used for, i.e. there is no change of use, the credit can be awarded where:

    a. At least 25% of the façade by area of the **total** building is to be reused;
    b. At least 80% of the façade by mass of the **existing** building is made up from in-situ reused material.

    The criteria in this instance are reduced as the existing building is likely to require less remedial work as it is not subject to a change of use.

Compliance Notes	
New Build	New-build schemes with retained façades provide a means of achieving the credit.
Refurbishment	Refurbishment projects are likely to achieve this credit without difficulty.
Extensions to existing buildings	There are no additional or different criteria to those outlined above specific to the assessment of extensions to existing buildings.
Fit Out only	Issue not applicable for Fit Out-only assessments
Curtain walling & windows	Where existing windows are being replaced they may be excluded from the calculation of façade area; however, curtain walling counts as façade.

Schedule of Evidence Required

Req.	Design Stage	Post Construction Stage
1&2	Drawings detailing: • The elevations of the existing and the new-build façades. Calculations demonstrating: • The % of façade comprising in situ material. These calculations should be simply based on the volume of each material and its density, with totals compared for the new and retained parts of the structure.	Assessor's building/site inspection and photographic evidence confirming: • The existence of the reused façade. As built drawings/calculations. Written confirmation from the design team or contractor of any changes to the specification for the façade.
3	As above.	As above.

Additional Information

Relevant definitions

Façade: Any exposed building face, not just the front elevation. The definition excludes party walls.

In practice, reusing façades will often require extensive renovation and/or reinforcement, hence the BREEAM requirement for at least 80% by mass of the reused façade to be in situ reused material. Façades with new external cladding or internal lining therefore can gain this credit provided that this criterion is met.

Issue ID	Issue Title	No. of credits available	Minimum standards
Mat 4	Re-Use of Structure	1	No

Aim

To recognise and encourage the reuse of existing structures that previously occupied the site.

Assessment Criteria

The following demonstrates compliance:

1. Where at least 80% by volume of an existing primary structure is reused without significant strengthening or alteration works.

2. Where a project is part refurbishment and part new build, the reused structure comprises at least 50% by volume of the final building, i.e. any new-build extension to a building being refurbished should not be larger than the original building to qualify for this credit.

3. Where an existing building is being reused and/or extended and the function/purpose of the new building will be the same as that which the existing building was used for, i.e. there is no change of use, the credit can be awarded where;

    a. 80% of the **existing** building structure, by gross building volume, is reused without significant strengthening or alteration works.
    b. The reused structure comprises at least 25%, by gross building volume, of the **final total** building structure.

Compliance Notes	
New Build	There are no additional or different criteria to those outlined above specific to the assessment of new-build projects.
Refurbishment	Refurbishment projects are likely to be the only buildings to achieve this credit.
Extensions to existing buildings	There are no additional or different criteria to those outlined above specific to the assessment of extensions to existing buildings.
Fit Out Only	Issue not applicable for Fit out-only assessments

Schedule of Evidence Required

Req.	Design Stage	Post Construction Stage
1&2	Drawings or design team calculations detailing: • The sections of the existing structure to be reused. • Any parts of the structure to be demolished and the total new structure. • Where appropriate, calculations confirming any strengthening/alteration are not deemed 'significant' in terms of the assessment criteria for the mass of materials used.	As built drawings/calculations. Written confirmation from the design team or contractor of any changes to the structural specification.
3	As above.	As above.

Additional Information

Relevant definitions

Significant strengthening or alteration: Defined as where the mass of new material is equal to or greater than 50% of the total mass of the reused structure.

Primary structure: Defined as structural floors, columns, beams, load bearing walls and foundations i.e. where required for structural use by the new building.

Issue ID	Issue Title	No. of credits available	Minimum standards
Mat 5	Responsible Sourcing of Materials	3 (new build/refurbs) 2 (Fit Out)	No

Aim

To recognise and encourage the specification of responsibly sourced materials for key building elements.

Assessment Criteria

The following demonstrates compliance:

New Build and Major Refurbishment assessments

1. Up to 3 credits are available where evidence provided demonstrates that 80% of the *applicable materials* (listed below) comprising each of the following building elements are responsibly sourced:

    a. Structural Frame
    b. Ground floor
    c. Upper floors (including separating floors)
    d. Roof
    e. External walls
    f. Internal walls
    g. Foundation/substructure
    h. Staircase

    Applicable materials

    - Brick (including clay tiles and other ceramics)
    - Resin-based composites and materials, including GRP and polymeric render
    - Concrete (including in-situ and pre-cast concrete, blocks, tiles, mortars, cementious renders etc.)
    - Glass
    - Plastics and rubbers (including EPDM, TPO, PVC and VET roofing membranes including polymeric renders)
    - Metals (steel, aluminium etc.)
    - Dressed or building stone including slate
    - Timber, timber composite and wood panels (including glulam, plywood, OSB, MDF, chipboard and cement bonded particleboard)
    - Plasterboard and plaster
    - Bituminous materials, such as roofing membranes and asphalt
    - Other mineral-based materials, including fibre cement and calcium silicate
    - Products with recycled content

    Note: Insulation materials, fixings, adhesives and additives are excluded from the assessment. For any other materials that form a part of an applicable building element, but do not fit into the applicable materials list or the exclusions list, please refer to BRE who will identify the relevant Key Process and Supply Chain Process or Processes.

2. Each *applicable material* is assigned to a responsible sourcing tier level based on the level and scope of certification achieved by the material supplier(s)/manufacturer(s) (see

Table 15 Responsible Sourcing Tier Levels and Criteria in the additional guidance section).

3. Follow the *Calculation Procedure* outlined in the additional guidance section, and use the *Mat 5 Responsible Sourcing Calculator* to determine the number of credits to be awarded.

4. Any non-certified timber used in the development comes from a legal source and is not included on the CITES list (see definition for legally sourced timber).

Fit Out-only assessments

1. Up to 2 credits are available where evidence provided demonstrates that 80% of the applicable materials (listed below) comprising the following fit out elements are responsibly sourced:

    a. Stairs
    b. Windows
    c. External and internal doors
    d. Skirting
    e. Panelling
    f. Furniture
    g. Fascias
    h. Any other significant use

    Applicable materials

    - Brick (including clay tiles and other ceramics)
    - Resin-based composites and materials, including GRP and polymeric render
    - Concrete (including in-situ and pre-cast concrete, blocks, tiles, mortars, cementious renders etc.)
    - Glass
    - Plastics and rubbers (including EPDM, TPO, PVC and VET roofing membranes including polymeric renders)
    - Metals (steel, aluminium etc.)
    - Dressed or building stone including slate
    - Timber, timber composite and wood panels (including glulam, plywood, OSB, MDF, chipboard and cement bonded particleboard)
    - Plasterboard and plaster
    - Bituminous materials, such as roofing membranes and asphalt
    - Other mineral-based materials, including fibre cement and calcium silicate
    - Products with recycled content

2. Each applicable material is assigned to a responsible sourcing tier level based on the level and scope of certification achieved by the material supplier(s)/manufacturer(s) (see Table 15 Responsible Sourcing Tier Levels and Criteria and Table 16 EMS Criteria in the additional guidance section).

3. Follow the *Calculation Procedure* outlined in the additional guidance section, and use the *Mat 5 Responsible Sourcing Calculator* to determine the number of credits to be awarded.

4. Any non-certified timber used in the development comes from a legal source and is not included on the CITES list (see definition for legally sourced timber).

Exemplary level criteria

The following outlines the exemplary level criteria to achieve an *innovation credit* for this BREEAM issue:

1. Where, in addition to the above criteria, 95% of the applicable materials, comprised within the applicable building elements, have been responsibly sourced.

Compliance Notes

New Build	There are no additional or different criteria to those outlined above specific to new-build projects.
Refurbishment	In the case of a refurbishment assess the newly specified applicable and reused materials (reused as defined below).
Extensions to existing buildings	There are no additional or different criteria to those outlined above specific to the assessment of extensions to existing buildings.
Fit Out-Only	There are no additional or different criteria to those outlined above specific to Fit Out-only assessments.
Building element not present	Where an element is not present in a project (e.g. an assessment of a ground floor of a building only and therefore no roof in the scope of the assessment), the points for this/these element(s) will be redistributed by the BREEAM Assessor's responsible sourcing calculator to reward only the elements being assessed.
Reused in-situ materials	Materials reused in-situ can be excluded from the assessment. The aim of this issue is to focus on the responsible sourcing of new specified materials.
Specified reused Materials	Reused materials specified for the development e.g. recycled aggregates are considered equivalent to materials covered by certification schemes that fall within tier 1 of Table 15 Responsible Sourcing Tier Levels and CriteriaTable 15 Responsible Sourcing Tier Levels and Criteria.
Insulating materials	The responsible souring of materials used for insulating the building fabric and services is assessed as part of BREEAM Materials section issue Mat 6 *Insulation* (see below). Therefore insulating materials are not assessed as part of this assessment issue, but they are still subject to BREEAM's responsible sourcing requirements.
CITES list	CITES (Convention on International Trade in Endangered Species) Appendices I and II of the CITES list[82] illustrate species of timber that are protected outright. Appendix III of the CITES list illustrates species that are protected in at least one country. If a timber species used in the development is on Appendix III it can be included as part of the assessment as long as the timber is not obtained from the country(ies) seeking to protect this species (see Additional Information for further details).
A Government licence	A Government licence e.g. UK Forestry Commission felling licence certificate, does not comply as a third party timber certification scheme for this credit, but can be used as evidence of legally sourced timber.
Pre or post consumer waste	Where materials being assessed (including timber) are part of a pre- or post-consumer waste stream, the EMS sections of the credit can be applied for; however, using an EMS scheme (ISO, EMAS etc.) for new timber does not demonstrate timber certification and therefore does not qualify for any of these BREEAM credits.
Checklist A5	Checklist A5 contains information for the BREEAM assessor, including an explanation of what is required for each of the responsible sourcing tiers.

Schedule of Evidence Required

Req.	Design Stage	Post Construction Stage
1	Design plan and/or specification confirming: • the location of elements and materials specified • Details of the materials specified.	As built drawings or as built specifications confirming that the building has been constructed in accordance with the design stage drawings/specifications. Copies of purchase orders or receipts or certificate/letter of conformity for all applicable materials, including those recycled or reused
2&3	A copy of the output from the Responsible Sourcing of Materials Calculator Tool. **AND EITHER** A letter of intent from the design team confirming: • The product shall be sourced from suppliers capable of providing certification to the level required for the particular tier claimed. **OR** If the material has been ordered, supplied or the supplier is known: • Purchase order from the supplier including (as appropriate) Chain of Custody (CoC) number and/or BES6001:2008 Certificate number and/or EMS Certificate number **OR** • A copy of the CoC and/or BES6001 and/or EMS certificate.	A copy of the output from the Responsible Sourcing of Materials Calculator Tool (if different from Design Stage calculation). A copy of the CoC and/or BES6001 and/or EMS (EMAS/ISO14001) certificate. **OR** For *Small* companies, (see *Relevant Definitions*) confirmation that the company EMS is structured in compliance with either: • BS8555 2003 (or equivalent) and the EMS has completed phase audits one to four as outlined in BS8555. This evidence can be found from company documentation demonstrating the process and typical outputs from phase four audits such as an EMS manual/paperwork and guidance to staff. Where independent certification exists to demonstrate these phases, it can be used as evidence. • Green Dragon Environmental Standard ® 2006 (Safon Amgylcheddol Y Ddraig Werdd ®) completed up to and including Level 4. Confirmation is taken from a Green Dragon Standard certificate stating the company's achievement of Level 4. As company's achieving Level 4 will normally be required to undertake annual audits, this certification should be dated within 1 year at the point of the last purchase made from the company. For smaller companies with low environmental impacts, a renewal date of within 2 years is acceptable. For clarification on whether a company is certified against the Green Dragon Environmental Standard please see the Register of companies available at the Green Dragon website.

4	Written confirmation from the developer confirming that: • All timber will come from a 'legal source' and one not on the CITES list*. * Or in the case of Appendix III of the CITES list, it has not been sourced from the country seeking to protect this species as listed in Appendix III.	Where any non-certified timber is used, written confirmation from the supplier(s) confirming that: • All timber comes from a legal source. • All timber species and sources used in the development are not listed on any of the CITES appendices for endangered or threatened species (Appendix I, II, or III*). * Or in the case of Appendix III of the CITES list, it has not been sourced from the country seeking to protect this species as listed in Appendix III.

Additional Information

Calculation Procedure: BREEAM Assessor's Mat 5 & Mat 8 Responsible Sourcing calculator tool
(note: issue Mat 8 applicable only to buildings using the Multi-residential BREEAM scheme)

1. Choose from the list of options in the drop down menu of the calculator the appropriate assessment and scheme type and press the select button.
2. For each element, select from the drop down menu the number of different types/specifications of that element you wish to enter and press the select button. If the element is not present select '0'. Note: selecting zero will adjust the points required benchmarks accordingly (see below).
3. For each element, select the 'data type' from the relevant drop down menu. There are two options depending on the element type, 'Volume' or 'Percentage'.

   Volume

   a. For all present elements and element type/specifications, enter the names of the material types comprising each individual type/specification in the relevant cell of the column *material types*.

   b. Enter the volume of each individual material type in the relevant cell of the column titled *percentage/volume of relevant materials present*.

   c. Enter the total combined volume of the material types in the cell *total volume of element present.*

   d. Enter the volume of each material that complies with either tier 1, 2a or b, 3 or 4, as appropriate. At least 80% of the total volume of each type must comply with one or more of the tiers to achieve any points for that element type.

   Percentage

   a. For all present elements and element type/specifications, enter the names of the material types comprising each individual type/specification in the relevant cell of the column *material types*.

   b. Enter the percentage of each individual material type (as a percentage of the whole element type) in the relevant cell of the column titled *percentage/volume of relevant materials present*.

   c. Enter the percentage of each material (as a percentage of the whole element type) that complies with either tier 1, 2a or b, 3 or 4, as appropriate. At least 80% of the materials that make up an element type must comply with one or more of the tiers to achieve any points for that element type.

Combination

a. For each type/specification of an element data must be entered by volume or percentage. However, it is not necessary to enter all the data using only one of either volume or percentage, for example one type of an element can be entered using volume and another type using percentage (according to how the relevant building information is sourced/provided).

Percentage material breakdown for Green Guide specifications available via the online responsible sourcing calculator
BRE Global can, via the *online Responsible Sourcing Calculator*, provide Licensed BREEAM Assessors with a percentage breakdown of materials for any elemental specification with a Green Guide rating.

Assessors can use the online tool to determine the percentage breakdown in two ways; either by entering an individual Green Guide *element number* for the required specification (if known) or doing a search by building and element type using the relevant drop down menus and elemental specification details provided by the design team.

The Assessor must then take the returned data and enter it in to the Mat 5 & 8 calculator tool in accordance with the procedure described above for percentage data entry.

The BREEAM Assessor must reference in their Certification report the Green Guide *element number* for any data sourced from the online Responsible Sourcing Calculator.

The online Responsible Sourcing Calculator can be accessed by Licensed BREEAM Assessors via the BREEAM Assessor's Extranet (there is also a link to the online calculator in the Assessor's Mat 5&8 calculator tool).

4. Once all data has been entered correctly and in compliance with the criteria, the tool will calculate the total number of points achieved and translate this into the number of credits awarded, as follows:

The following scale is used to award credits for new builds and major refurbishment projects:

a. ≥15 points 3 credits awarded
b. ≥10 points 2 credits awarded
c. ≥5 points 1 credit awarded

The following scale is used to award credits for fit-out projects:

a. ≥15 points 2 credits awarded
b. ≥10 points 1 credits awarded

Assessors Calculation procedure: Post Construction/Post Fit Out stage
The procedure for calculating the number of credits achieved at the interim and final stages of assessment is the same; however at the final stage of assessment Assessors will need to:

1. Check that the *As Built* construction matches that proposed at design stage (see *Schedule of Evidence*). Where there are any differences in the specification, obtain the relevant volumes and/ or percentages of materials for each element that differs.

2. Obtain the relevant confirmation of tier level achieved (see *Schedule of Evidence*) for all materials, from all sources/suppliers.

3. Confirm and/or re-assign tier levels to each material based on the level of certification provided (see Table 15 Responsible Sourcing Tier Levels and Criteria and *Information Required to Demonstrate Compliance).*

4. Adjust the Mat 5 & 8 Responsible Sourcing Calculator accordingly to include any revised information/data, following the calculation procedures described above.

Note:

Where one or more elements are not applicable i.e. they are not contained within the building e.g. upper floors, the number of points required to credits available are re-allocated based on the number of elements that are specified (the Mat 5 & 8 calculator tool will confirm the adjusted benchmark scale).

Although only 80% of the materials in an element have to be assessed, it may be beneficial to include even small percentages of materials that are in tiers higher than those for the 80% compliant materials, as this will contribute to the total amount of points achieved.

A maximum of three points is achievable for each element; therefore for example, where there are two types/specifications for an individual element, each individual type can contribute up to a maximum of 1.5 points. Likewise, if there are four types, each can contribute up to a maximum of 0.75 points (the maximum points achievable is based on 80% of the applicable materials achieving tier 1 certification status).

Table 15 Responsible Sourcing Tier Levels and Criteria

Tier level	Issue assessed	Points available per element	Evidence / measure assessed	Examples of compliant schemes
1	Legality & responsible sourcing	3	Certification scheme	FSC, CSA, SFI with CoC, PEFC, Reused Materials, Schemes compliant with BES6001:2008[83] (or similar) Excellent* and Very Good* Performance Ratings (Note; the EMS required to achieve these ratings must be independently certified**)
2a	Legality and responsible sourcing	2.5	Certification scheme	Schemes compliant with BES6001:2008 (or similar) 'Good' Performance Rating (Note: the EMS required to achieve this rating must be independently certified**).
2b	Legality and responsible sourcing	2	Certification scheme	Schemes compliant with BES6001:2008 (or similar) 'Pass' Performance Rating (Note: the EMS required to achieve this rating must be independently certified).
3	Legality & responsible sourcing	1.5	Certification scheme/ EMS	Timber: MTCC***, Verified****, SGS, TFT
				Other materials: Certified EMS for the Key Process and *Supply Chain*.
				Recycled Materials with certified EMS for the *Key Process*
4	Legality & responsible sourcing	1	Certification scheme/EMS	Certified EMS for key process stage.

Where any timber is used, it must be legally sourced. Where evidence cannot be provided to demonstrate legal sourcing for any element, no points can be awarded for the Responsible Sourcing Issue.

Where cement and aggregate, or dry mix concrete are mixed on site, (i.e. not concrete previously certified as pre–cast concrete products or wet ready mix concrete), certification must cover the manufacture of the cement as the primary process, and the extraction of the aggregate and limestone used to make the cement as the supply chain process.

* Performance ratings for schemes compliant with BES6001:2008 (or similar) can only be used to demonstrate compliance with the assessment criteria for this issue where certification covers the key process and supply chain processes for the material being assessed.

** In BES6001:2008 to achieve a 'Pass', level 'a' must, as a minimum, be achieved for clauses 3.3.1, 3.3.2 and 3.3.3. Under clause 3.3.2 level 'a' requires a documented EMS system following the principles of ISO14001, but not formal certification. To achieve higher ratings such as 'Good', 'Very Good' and Excellent a minimum number of points from a combination of clauses 3.3.1, 3.3.2 and 3.3.3 must be achieved. It is possible therefore to get a 'Good' or 'Very good' rating by only complying with level 'a' for clause 3.3.2 and levels 'c' and 'd' for the other two clauses without necessarily having in place a formal independently certified EMS (as required above). In conducting BES6001 assessment, if the assessor confirms full compliance with clause 3.3.2 level 'a' the requirement for an independently certified EMS has been met.

*** PEFC International has recently endorsed the Malaysian MTCS scheme, as a result any MTCC timber certified against the new PEFC endorsed scheme documents can be classified as tier 1 for the purposes of the BREEAM assessment. The PEFC endorsement only covers certificates issued against the latest MTCC scheme documents, it must be stressed therefore that any holders of certifications against the previous MTCC scheme documents, including the forest management standard MC&I 2001 or any parts thereof, are NOT PEFC endorsed and this timber must still be classified as Tier 3.

When seeking the higher tier level for MTCC certified timber the assessor will need to verify the above via the scope of the supplier's certificate.

For further information and guidance please visit the PEFC website:
http://www.pefc.org/internet/html/members_schemes/4_1120_59/5_1246_320/5_1123_1887.htm

******* "Verified" is the name of a scheme produced by SmartWood.

Table 16 EMS Criteria

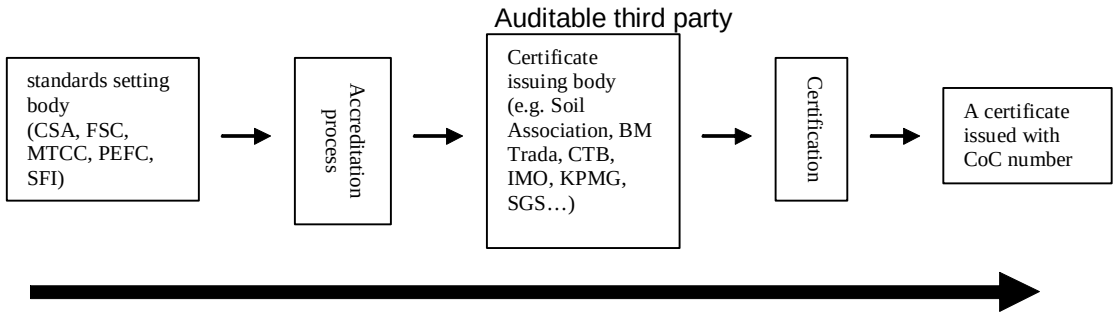
Material	Key Process	Supply chain processes
Brick (including clay tiles and other ceramics)	Product Manufacture	Clay Extraction
Resin-based composites and materials (including GRP and polymeric render but excluding timber based composites)	Composite product manufacture	Glass fibre production (or other principle matrix material) Polymer production
In situ Concrete (including ready mix and cemetitious mortars and renders)	Ready mixed concrete plant	Cement production Aggregate extraction and production
Precast concrete and other concrete products (including blocks, cladding, precast flooring, concrete or cementitious roof tiles)	Concrete product manufacture	Cement production Aggregate extraction and production
Glass	Glass production	Sand extraction Soda Ash production or extraction
Plastics and rubbers (including polymeric renders, EPDM, TPO, PVC and VET roofing membranes)	Plastic/rubber product manufacture	Main polymer production
Metals (steel, aluminium etc)	Metal Product manufacture - e.g. cladding production, steel section production	Metal production: Steel: Electric arc furnace or Basic oxygen furnace process, Aluminium, ingot production, Copper: ingot or cathode production.
Dressed or building stone (including slate)	Stone product manufacture	Stone extraction
Plasterboard and plaster	Plasterboard or plaster manufacture	Gypsum extraction Synthetic gypsum (from flue gas desulphurisation) by default (recycled content)
Virgin timber	Timber from certified sources	Timber from certified sources
Cement Bonded Particle Board	Due to the significant cement content, in addition to requiring timber certification, the key supply chain process must also be considered to obtain the relevant tier: Timber from certified sources	Cement production Timber from certified sources
Wood panel and wood based composite products such as Oriented Strand Board, plywood, HPL, chipboard/particle, glulam, LVL,etc.)	Wood products, including those with recycled content, can only use the Timber Certification route	
Bituminous materials, such as roofing membranes and asphalt	Product manufacture	Bitumen production Aggregate extraction and production
Other mineral-based materials, including fibre cement and calcium silicate	Product manufacture	Cement production lime production other mineral extraction and production
Products with 100% recycled content	Product manufacture	Recycled input by default
Products with lower % of recycled content	Product manufacture	Supply chain process/processes for any virgin material in the relevant product type above. Recycled input by default
Any other product	Key processes is likely to be product manufacture	1 or 2 main inputs with significant production or extraction impacts should be identified
Excluded products: insulation materials, fixings, adhesives, additives	N/A	N/A

Timber and Environmental Management Schemes (EMS)
Where an Environmental management scheme is used to assess products made from recycled timber, 100% of the timber content must be recycled or sourced from one of the recognised timber certification schemes in Table 15 Responsible Sourcing Tier Levels and Criteria. A timber product with 50% recycled timber and 50% legally sourced timber will not comply with the criteria and will not be awarded any points.

Using an EMS for new timber does not demonstrate timber certification and therefore does not qualify for points.

Chain of Custody
This is a process used to maintain and document the chronological history of the evidence/path for products from forests to consumers. Wood must be tracked from the certified forest to the finished product. All the steps, from transporting wood from the forest to a sawmill, until it reaches the customer, must maintain adequate inventory control systems that allow for separation and identification of the certified product. Chain-of-custody certification ensures that a facility has procedures in place to track wood from certified forests and avoid confusing it with non-certified wood. Chain-of-custody is established and audited according to relevant forest certification systems rules.

Third party certification process



Timber certification process

CITES - Convention on International Trade in Endangered Species of wild fauna and flora (extract taken from the CITES website)

''CITES works by subjecting international trade in specimens of selected species to certain controls. All import, export, re-export and introduction from the sea of species covered by the Convention has to be authorized through a licensing system. Each Party to the Convention must designate one or more Management Authorities in charge of administering that licensing system and one or more Scientific Authorities to advise them on the effects of trade on the status of the species.

The species covered by CITES are listed in three Appendices, according to the degree of protection they need.

1. Appendix I includes species threatened with extinction. Trade in specimens of these species is permitted only in exceptional circumstances.
2. Appendix II includes species not necessarily threatened with extinction, but in which trade must be controlled in order to avoid utilization incompatible with their survival.
3. Appendix III contains species that are protected in at least one country, which has asked other CITES Parties for assistance in controlling the trade.''

Calculation of Timber Volumes

a. Most of the information on areas, lengths and volumes of timber will be available from the component manufacturers or estimator, who should provide a detailed breakdown of quantities of materials.

b. In order to calculate the volume of wood in timber frame windows, the total length of frame must be obtained. This can then be converted to a volume by multiplying the length of frame on fixed windows by 0.00653 and the length of frame on opening windows by 0.01089.

c. In order to calculate the volume of timber in composite timber doors such as a flush door, calculate the total area of all doors summed over the whole building and multiply this by 0.02187 (this factor gives the total volume of timber in the doors and frames).

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.

The framework comprises a number of criteria setting out the criteria of an organisation in managing the supply of construction products in accordance with a set of agreed principles of sustainability. To comply with the standard a product must meet a number of mandatory criteria, where a product demonstrates compliance beyond the mandatory levels, higher levels of performance can be achieved. The standard's performance ratings range from Pass to Good, Very Good and Excellent.

The development of this standard and subsequent certification schemes will, it is envisaged, provide construction products, not wholly covered under current recognised standards, a means for demonstrating their responsibly sourced credentials. In turn this will allow clients, developers and design teams to specify responsibly sourced construction products with greater assurance and provide a means of demonstrating compliance with the assessment criteria for this BREEAM issue.

To view a list of products approved to BES6001:2008 visit: www.greenbooklive.com/page.jsp?id=169

For further information about BES6001:2008, including a copy of the standard itself visit: www.greenbooklive.com/page.jsp?id=153

Relevant Definitions

Composite material: can be defined as an engineered material made from two or more constituent materials with significantly different physical or chemical properties and which remain separate and distinct on a macroscopic level within the finished structure. Resin based composites such as GRP and polymeric render and timber composites such as Chipboard/Particleboard, MDF, OSB, plywood, hardboard, laminated veneered lumber, glulam and cement bonded particleboard are all required to be assessed for responsible sourcing.

Frame: The frame is any of the main structural elements that are not included in the roof, external walls and floors. For example, timber or metal studwork within a plasterboard partition would be included within the internal walls, and timber joists would be included within the floor construction.

Where a concrete or steel frame is used, this would be treated as the Frame as it would not be integral to the internal walls for example.

Green Dragon Environmental Standard ® (Safon Amgylcheddol Y Ddraig Werdd ®): A stepped standard used to accredit compliance with the Green Dragon Environmental Management Scheme. Dependant 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 assessment of this BREEAM issue. www.greendragonems.com

Green Guide Element Number: See Mat 1.

Key Processes: 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. The criteria for each of the assessed materials are detailed in Table 16 EMS Criteria.

Legally Sourced Timber: BREEAM follows the UK Government's definition of legally sourced timber, as outlined in the CPET 2nd Edition report on UK Government Timber Procurement Policy[84], which states that legal timber and wood derived products are those which originate from a forest where the following criteria are met:

1. The forest owner/manager holds legal use rights to the forest.
2. There is compliance by both the forest management organisation and any contractors with local and national legal criteria including those relevant to:

    a. Forest management
    b. Environment
    c. Labour and welfare
    d. Health & safety
    e. Other parties' tenure and use rights

3. All relevant royalties and taxes are paid.
4. There is compliance with the criteria of CITES.

Relevant documentation demonstrating the above must be provided or made available on request subject to the availability of such materials in the country concerned. Certification from any of the timber certification schemes identified in tiers 1, 2 and 4 for this credit demonstrate legally sourced timber.

Mat 5 & 8 Responsible Sourcing Calculator: The spreadsheet based calculator tool used by the BREEAM Assessor to determine the number of BREEAM credits achieved for the Mat 5 assessment issue (and in the case of the BREEAM *Multi-Residential* scheme, the Mat 8 assessment issue).

Online Responsible Sourcing Calculator: A web based calculator tool for determining the percentage breakdown of materials that comprise a specific building elemental specification e.g. an external wall. Data is available for all elemental specifications that have a Green Guide rating. The calculator is available to Licensed BREEAM Assessors via the Assessor's online Extranet.

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.

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.

Responsible Sourcing: Demonstrated through auditable third party certification schemes.

Reused materials: Materials that can be extracted from the waste stream and used again without further processing, or with only minor processing, that does not alter the nature of the material (e.g. cleaning, cutting, fixing to other materials).

Recycled Material: Materials diverted from the pre-consumer and/or post-consumer waste streams that require significant processing before they can be used again. For further information please see *Calculating and declaring recycled content in construction products, "Rules of Thumb" Guide* (WRAP, 2008) www.wrap.org.uk/wrap_corporate/news/wraps_rules_of.html.

Supply Chain EMS: covers all of the major aspects of processing and extraction involved in the supply chain for the end product. Note that 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.

Small Company: A company is defined as 'small' if it satisfies at least two of the following criteria:

a. A turnover of not more than £5.6 million;
b. 50 employees or fewer.

This is based on the definition stated in the Companies Act of 1985.

Tier levels – a graded scale to reflect the rigour of the certification scheme used to demonstrate responsible sourcing, forming the basis for awarding points (all as detailed in Table 15 Responsible Sourcing Tier Levels and Criteria).

Issue ID	Issue Title	No. of credits available	Minimum standards
Mat 6	Insulation	2	No

Aim

To recognise and encourage the use of thermal insulation which has a low embodied environmental impact relative to its thermal properties and has been responsibly sourced.

Assessment Criteria

The following demonstrates compliance:

1. Any new insulation specified for use within the following building elements must be assessed:

    - External walls
    - Ground floor
    - Roof
    - Building services

First credit - Embodied Impact

2. The *Green Guide* rating for the thermal insulation materials must be determined. Green Guide ratings for thermal insulation can be found at: www.thegreenguide.org.uk (please refer to the Compliance Notes for guidance where specific insulation has been assessed within an element for the Mat 1 BREEAM issues).

3. Where the *Insulation Index* for the building insulation is the same as or greater than 2.

4. The *Insulation Index* is calculated using the Mat 6 *Insulation Index Calculator Tool* in the BREEAM assessor's spreadsheet tool. For each type of thermal insulation used in the relevant building elements, the volume weighted thermal resistance provided by each type of insulation is calculated as follows:

    a. (Area of insulation (m^2) * thickness(m)) / Thermal Conductivity (W/ m.K) **OR**
    b. Total volume of insulation used (m^3) / Thermal conductivity (W/m.K)

    The volume weighted thermal resistance for each insulation material is then multiplied by the relevant Green Guide point(s) from the following table:

Table 17 Green Guide rating points/element

Green Guide Rating	Points/element
A+	3
A	2
B	1
C	0.5
D	0.25
E	0

To calculate the *Insulation Index*, the sum of these values is divided by the sum of the volume weighted thermal resistance values (an example calculation is provided in the Additional Information section).

Second credit - Responsible Sourcing

5. At least 80% of the thermal insulation used in the building elements identified in Item 1 must be responsibly sourced, i.e. each insulation product must be certified in accordance with Levels 1, 2 or 3 described in Table 15 Responsible Sourcing Tier Levels and Criteria, as outlined in Mat 5. The table below shows the key processes and supply chain processes required for common insulation products.

Table 18 EMS criteria for insulation products

Material	Key Process	Supply chain processes
Foam Insulation	Insulation manufacture	Principal Polymer production, e.g. Polystyrene, MDI , Phenolic resin or equivalent
Stone wool, glass & cellular glass made using < 50% recycled input	Product manufacture	Any quarried or mined mineral over 20% of input
Wool	Product manufacture	Wool Scouring
Products using > 50% recycled content except those using timber	Product manufacture	Recycled content by default
Timber-based insulation materials including those using recycled timber	Product manufacture	Recycled timber by default, all other timber from one of the recognised timber certification schemes in Table 15 Responsible Sourcing Tier Levels and Criteria.
Other renewable-based insulation materials using agricultural by-products (e.g. straw)	Product manufacture	By-product manufacture by default
Any other product	Product manufacture	1 or 2 main inputs with significant production or extraction impacts should be identified

Compliance Notes	
New Build	There are no additional or different criteria to those outlined above specific to new-build projects.
Refurbishment and materials reused in-situ	For each element that is reused in-situ, BREEAM allocates an 'A+' rating. For the purpose of responsible sourcing, existing in-situ insulating materials are not assessed. If no new insulating products are being specified as part of the refurbishment both credits can be awarded.
Extensions to existing buildings	There are no additional or different criteria to those outlined above specific to the assessment of extensions to existing buildings.
Fit Out only	For a Fit Out-only assessment the criteria apply to all types of new insulation specified, typically this may only require the insulation for the building services to comply. Where no new insulation is specified as part of the fit-out works, the compliance note for refurbishment projects (above) applies.

Insulation incorporated as part of an off-site manufactured element	If the insulation is incorporated as a component of an element that has been manufactured offsite e.g. a wall or roof, and that element has been assessed as part of Mat 1, then for the purpose of assessing the insulation for this BREEAM issue, a Green Guide rating of A+ should be used. The same rule applies to insulation that has a significant additional function, such as providing supporting structure e.g. structural insulated panels (SIPS). In the Green Guide the actual insulation will be listed within the element title, rather than under the generic insulation category.
Awarding credits	Both credits can be awarded independently of each other - i.e. it is not a requirement of the second credit that the first is achieved, and vice-versa.
Element consisting of more than one insulation	Where more than one insulation type is present for a given element, the rating, area and conductivity for each insulation should be entered into the tool and an average is calculated (by area).
Finding exact Green Guide Ratings	Where no similar insulation can be found assessors should seek guidance from BRE on the appropriate rating.

Schedule of Evidence Required

Req.	Design Stage	Post Construction Stage
1-4	Marked-up design plan/elevations and/or a copy of the specification confirming: • The location of insulating materials. • The area (m^2) and thickness (m) or volume (m^3) of insulation specified. Manufacturer's technical details confirming: • Thickness and thermal conductivity of the insulating materials specified. A copy of the output from the Insulation Index Calculator Tool. The Green Guide rating and *element number* for the assessed insulation specifications.	Assessor's building/site inspection and photographic evidence confirming: • Element in-situ (where possible) **AND** As built drawings and, where relevant, written design team confirmation of any changes to the materials specification.
5	Evidence (as outlined in Mat 5) confirming compliance for the insulating materials.	Evidence (as outlined Mat 5) confirming compliance.

Additional Information

Relevant definitions

Green Guide: Refer to definitions in Mat 1.

Green Guide Element Number: Refer to definitions in Mat 1.

Insulation Index: A measure of performance used in BREEAM that seeks to assess the thermal properties of insulation products used in the building relevant to the embodied impact of that insulating material.

Insulation Index Calculator Tool: A spreadsheet tool used by the BREEAM assessor to determine the Insulation Index and therefore, whether the BREEAM credit is achieved.

Example calculation
The Insulation Index is calculated for a building using the following types of insulation as follows:

Type 1 Walls
Area = 450m^2. Thermal insulation thickness = 100mm. Thermal conductivity = 0.023 W/mK Green Guide rating = A (2 points)
Area weighted thermal resistance: ((450*0.100)/0.023) = 1956
Green Guide rating correction: 1956* 2.0 = 3912

Type 2 Building Services
Volume of insulation used = 21m^3. Thermal conductivity = 0.022 W/mK
Green Guide rating = C (0.5 points)
Area weighted thermal resistance: (21/0.022) = 955
Green Guide rating correction: 955 * 0.5 = 477

Type 3 Roof
Area = 210m^2. Thermal insulation thickness = 120mm. Thermal conductivity = 0.027 W/mK Green Guide rating = A+ (3 points)
Area weighted thermal resistance: ((210*0.120)/0.027) = 933
Green Guide rating correction: 933 * 3.0 = 2799

Type 4 Ground Floor
Area = 210m^2. Thermal insulation thickness = 120mm. Thermal conductivity = 0.027 W/mK Green Guide rating = B (1 point)
Area weighted thermal resistance: ((210*0.120)/0.027) = 933
Green Guide rating correction: 933 * 1.0 = 933

Total area weighted thermal resistance = 1956+955+933+933 = 4777
Green Guide rating correction = 3912 + 477 + 2799 +933 = 8121

Insulation Index: Green Guide Rating Correction / Total Area weighted thermal resistance = 8121/4777 = 1.7 (credit not achieved).

Issue ID	Issue Title	No. of credits available	Minimum standards
Mat 7	Designing for Robustness	1	No

Aim

To recognise and encourage adequate protection of exposed parts of the building and landscape, therefore minimising the frequency of use of replacement materials.

Assessment Criteria

The following demonstrates compliance:

1. Internal and external areas of the building where vehicular, trolley and pedestrian movement occur have been identified.

2. Suitable durability and protection measures or design features have been specified to prevent damage to the vulnerable parts of these building areas from such traffic. This must include, but is not necessarily limited to:

    a. Protection from the effects of high pedestrian traffic in main entrances, public areas and thoroughfares (corridors, lifts, stairs, doors etc).
    b. Protection against any internal vehicular/trolley movement within 1m of the internal building fabric in storage, delivery, corridor and kitchen areas.
    c. Protection against, or prevention from, any potential vehicular collision where vehicular parking and manoeuvring occurs within 1m of the external building façade for all car parking areas and within 2m for all delivery areas.

Compliance Notes	
New Build	There are no additional or different criteria to those outlined above specific to the assessment of new-build projects.
Refurbishment	Where the assessment is of a refurbished building on an existing site then the criteria apply to the areas that form a part of the works or hard landscape for that building.
Extensions to existing buildings	There are no additional or different criteria to those outlined above specific to the assessment of extensions to existing buildings.
Fit Out Only	There are no additional or different criteria to those outlined above specific to fit out-only assessments.
Suitable durability measures	Suitable durability and protection measures to vulnerable parts of the building can include: • Bollards/barriers/raised kerbs to delivery and vehicle drop-off areas • Robust external wall construction, up to 2m high • Corridor walls specified to Severe Duty (SD) as per BS 5234-2[85]. • Protection rails to walls of corridors • Kick plates/impact protection (from trolleys etc) on doors • Hard-wearing and easily washable floor finishes in heavily used circulation areas (i.e. main entrance, corridors, public areas etc)

Vehicle Impact Protection	Any vehicle impact protection measures specified must be positioned at an adequate distance from the building to protect the fabric from impact from any vehicle with a measurable overhang of the body from the wheel track, in particular for any goods delivery areas. In vehicle movement areas only; where the specification of external robust wall construction is specified to comply with the credit, additional protection must be provided to ensure against potential damage to the robust façade from vehicle movement, i.e. specifying bollards or protection rails.
Public / Common Areas	Consideration should be given to materials specification in public/common areas (especially public waiting areas and toilet areas) to provide protection against potential malicious or physical abuse in as far as it is possible.

Schedule of Evidence Required

Req.	Design Stage	Post Construction Stage
1	Design drawings marked up to illustrate: • Vulnerable areas/parts of the building.	Assessor's building/site inspection and photographic evidence confirming: • Vulnerable areas of the building • The durability measures in-situ.
2	Design drawings and/or specification confirming: • The durability measures specified.	

Additional Information

Relevant definitions
None.

10.0 Waste

Issue ID	Issue Title	No. of credits available	Minimum standards
Wst 1	Construction Site Waste Management	4 (new build/refurb) 2 (Fit Out)	No

Aim

To promote resource efficiency via the effective and appropriate management of construction site waste.

Assessment Criteria

The following demonstrates compliance:

New Build and Major Refurbishments - Up to three credits are available

1. Where non-hazardous construction waste generated by the building's construction phase (excluding demolition and excavation waste) meets or exceeds the following resource efficiency benchmarks:

	Amount of waste generated per 100m^2 (gross internal floor area)	
BREEAM credits	m^3	tonnes
One credit	13.0 - 16.6	6.6 - 8.5
Two credits	9.2 – 12.9	4.7 - 6.5
Three credits	<9.2	<4.7

* Volume (m^3) is actual volume of waste (not bulk volume)

2. Where there is a Site Waste Management Plan (SWMP) that contains:

    a. The target benchmark for resource efficiency i.e. m^3 of waste per 100m^2 or tonnes of waste per 100m^2
    b. Procedures and commitments for minimising non-hazardous waste in line with the benchmark
    c. Procedures for minimising hazardous waste
    d. Procedures for monitoring, measuring and reporting hazardous and non-hazardous site waste
    e. Procedures for sorting, reusing and recycling construction waste into defined waste groups (see additional guidance section), either on site or through a licensed external contractor
    f. The name or job title of the individual responsible for implementing the above.

Demolition & refurbishment projects

3. In addition to the above, sites with existing buildings that will be refurbished or demolished, where demolition forms a part of the principal contractor's works contract, must comply with the following:

    a. Completed a pre-demolition/pre-refurbishment audit of the existing building to determine if, in the case of demolition, refurbishment is feasible and, if not, to maximise the recovery of material from demolition or refurbishment for subsequent high-grade/value applications.

    The audit must be referenced in the SWMP and cover:
        i. Identification of the key refurbishment/demolition materials.
        ii. Potential applications and any related issues for the reuse and recycling of the key refurbishment and demolition materials.

Fit Out only assessments - one credit is available

1. Where there is a SWMP that contains:

    a. Procedures and commitments for minimising non-hazardous and hazardous waste
    b. Procedures for sorting, reusing and recycling construction waste into defined waste groups (see additional guidance section), either on site or through a licensed external contractor
    c. The name or job title of the individual responsible for implementing the above

2. Construction waste generated from the fit-out works is monitored and measured.

3. Waste materials will be sorted into separate key waste groups (according to the waste streams generated by the fit-out works) either onsite or offsite through a licensed contractor for recovery.

New build, Refurbishment and Fit Out only projects - one additional credit is available

1. Where at least 75% by weight or 65% by volume of non-hazardous construction waste generated by the project has been diverted from landfill and either:

    a. Reused on site (in-situ or for new applications)
    b. Reused on other sites
    c. Salvaged/reclaimed for reuse
    d. Returned to the supplier via a 'take-back' scheme
    e. Recovered from site by an approved waste management contractor and recycled.

2. For demolition projects, in addition to the above requirement for construction-related waste, 90% by weight or 80% by volume of non-hazardous demolition waste has been diverted from landfill.

3. Where there is a Site Waste Management Plan (SWMP) complying with the above criteria.

4. Waste materials will be sorted into separate key waste groups (according to the waste streams generated by the scope of the works) either onsite or offsite through a licensed contractor for recovery.

Exemplary level criteria
The following outlines the exemplary level criteria to achieve an *innovation credit* for this BREEAM issue.

1. Where non-hazardous construction waste generated by the building's development meets or exceeds the resource efficiency benchmark required to achieve three credits (as outlined above).

2. Where at least 90% by weight (80% by volume) of non-hazardous construction waste and 95% of demolition waste by weight (85% by volume) (if applicable) generated by the build has been diverted from landfill and either:

a. Reused on site (in-situ or for new applications)
b. Reused on other sites
c. Salvaged/reclaimed for reuse
d. Returned to the supplier via a 'take-back' scheme
e. Recovered from site by an approved waste management contractor and recycled.

3. All key waste groups are identified for diversion from landfill at pre-construction stage SWMP.

Compliance Notes	
New Build	There are no additional or different criteria to those outlined above specific to new-build projects.
Refurbishment	There are no additional or different criteria to those outlined above specific to refurbishment projects.
Extensions to existing buildings	If the building is part refurbishment part new-build extension then the whole building must be used to determine compliance with this issue. For assessments of extensions to existing buildings, where only the extension is being assessed, it is the extension only that must comply.
Fit Out Only	There are no additional or different criteria to those outlined above specific to fit-out-only assessments.
Pre-demolition/pre-refurbishment audit	A pre-demolition/pre-refurbishment audit should be carried out using an appropriate methodology. At the time of writing BRE are currently developing a tool as part of the SMARTWaste system for carrying out such audits, and the ICE has produced guidance on pre-demolition audits, including '*A report on the Demolition Protocol*'[86].
SWMP	Since April 2008 any construction project in England costing over £300k requires a Site Waste Management Plan. To achieve any of the construction site waste management credits the assessed development, regardless of value or locality, must have a SWMP compliant with best practice (see relevant definitions in additional guidance section).
Limited site space for segregation and storage	Where space on site is too limited to allow waste materials to be segregated, a waste contractor may be used to separate and process recyclable materials off site. Similarly, manufacturers' take-back schemes could also be used. Where this is the case, sufficient documentary evidence must be produced which demonstrates that segregation of materials is carried out to the agreed levels and that materials are reused/recycled as appropriate.

Schedule of Evidence Required

Req.	Design Stage	Post Construction Stage
All Credits and Exemplary level		
All	A copy of the compliant Site Waste Management Plan containing the appropriate benchmarks, commitments and procedures. Where relevant, a copy of the pre-demolition/pre-refurbishment audit. **OR** A copy of the specification clause that: • Requires the principal contractor to produce a SWMP in line with the criteria • Contains the detailed criteria with respect to resource efficiency benchmarks and target(s) and procedures to be included in the SWMP • Where relevant, requires the principal contractor to carry out a pre-demolition/pre-refurbishment audit. **OR** A letter from the client or their representative containing: • Confirmation that the specification will contain a clause on site waste management criteria. • An outline of the detailed criteria that will be included in that specification clause.	A copy of the SWMP summary datasheets or equivalent monitoring records/report confirming: • The total waste arising for the development. • Comparison of the total waste arising against the benchmark • Quantities of waste by groupings • Where required, the amount and proportion of waste arising that was reused, recycled and landfilled. • Custody/application/destination of reused/recycled materials.

Additional Information

Relevant definitions

Significant Majority: Defined as meeting at least the percentages required within the assessment criteria section of this manual.

Site Waste Management Plan (SWMP): SWMP aims to promote resource efficiency and to prevent illegal waste activities. Resource efficiency includes minimising waste at source and ensuring that clients, designers and principal contractors assess the use, reuse and recycling of materials and products on and off the site.

Best Practice SWMP: Best practice (site waste management) is a combination of commitments to:

a. design out waste
b. reduce waste generated on site
c. develop and implement procedures to sort and reuse/recycle construction waste on and off site (as applicable).

d. follow guidance from:
- DEFRA (Department of Environment, Food and Rural Affairs)
- BRE (Building Research Establishment)
- Envirowise
- WRAP (Waste & Resources Action Programme)

Table 19 Construction waste groups

European Waste Catalogue)	Key Group	Examples
170102	Bricks	Bricks
170101	Concrete	Pipes, kerb stones, paving slabs, concrete rubble, precast and in situ
170604	Insulation	Glass fibre, mineral wool, foamed plastic
1501	Packaging	Paint pots, pallets, cardboard, cable drums, wrapping bands, polythene sheets
170201	Timber	Softwood, hardwood, boards products such as plywood, chipboard, medium density fibreboard (MDF)
1602	Electrical and electronic equipment	Electrical & electronic TVs, fridges, air-conditioning units, lamps equipment
200301	Canteen/office	Office waste, canteen waste, vegetation
1301	Oils	Hydraulic oil, engine oil, lubricating oil
1703	Asphalt and tar	Bitumen, coal tars, asphalt
170103	Tiles and ceramics	Ceramic tiles, clay roof tiles, ceramic, sanitaryware
1701	Inert	Mixed rubble/excavation material, glass
1704	Metals	Radiators, cables, wires, bars, sheet
170802	Gypsum	Plasterboard, render, plaster, cement, fibre cement sheets, mortar
170203	Plastics	Pipes, cladding, frames, non-packaging sheet
200307	Furniture	Tables, chairs, desks, sofas
1705	Soils	Soils, clays, sand; gravel, natural stone
Most relevant EWC	Liquids	Non-hazardous paints, thinners, timber treatments
Most relevant EWC	Hazardous	Defined in the Hazardous Waste List (HWL) of the European Waste Catalogue (EWC)
Most relevant EWC	Floor coverings (soft)	Carpets, vinyl flooring
Most relevant EWC	Architectural Features	Roof tiles, reclaimed bricks, fireplaces
170904 (Mixed)	Mixed/ other	Efforts should be made to categorise waste into the above categories wherever possible

BREEAM construction waste benchmarks

The benchmarks used have been derived from BRE's SMARTWaste system and through a DEFRA-funded project for predicting construction waste and will be updated annually for the purposes of BREEAM. The benchmarks are based on real-life data and have been subject to a number of statistical and logical tests. The benchmarks used apply to actual volume, and standard conversion factors have been used for tonnages from the Environment Agency. Compliance with the benchmarks can be demonstrated using either volume of weight of construction waste.

For more information on these benchmarks and to break them down by waste type, please go to www.smartwaste.co.uk

Tools for preparing, implementing and reviewing a SWMP
SMARTWaste Plan is a free web-based tool for preparing, implementing and reviewing a SWMP. This tool includes an integrated waste measurement tool (a revised SMARTStart) which is aligned to defined waste groups. SMARTWaste Plan will manage all aspects of creating SWMPs and measuring waste generated on projects. Templates are available to meet the BREEAM credits and can also be downloaded. The tool includes online waste measurement, industry waste benchmarks and links to BREMAP. A carbon calculator and economic assessment of waste will also be added.

BREMAP is a geographical information system of waste management facilities. See www.bremap.co.uk

Issue ID	Issue Title	No. of credits available	Minimum standards
Wst 2	Recycled Aggregates	1	No

Aim

To recognise and encourage the use of recycled and secondary aggregates in construction, thereby reducing the demand for virgin material.

Assessment Criteria

The following demonstrates compliance:

1. Where the amount of recycled and secondary aggregate specified is over 25% (by weight or volume) of the total *high-grade* aggregate uses for the building. Such aggregates can be **EITHER**:

    a. Obtained on site **OR**
    b. Obtained from waste processing site(s) within a 30km radius of the site; the source will be principally from construction, demolition and excavation waste (CD&E) – this includes road plannings **OR**
    c. Secondary aggregates obtained from a non-construction post-consumer or post-industrial by-product source (see Compliance Notes).

Compliance Notes	
New Build	There are no additional or different criteria to those outlined above specific to new-build projects.
Refurbishment	The credit available for this issue can be awarded automatically where no new aggregate is being used. Potentially the case in most refurbishments.
Extensions to existing buildings	There are no additional or different criteria to those outlined above specific to the assessment of extensions to existing buildings.
Fit Out Only	Issue not applicable for Fit-Out-only assessments
Secondary aggregates	Recognised non-construction post-consumer or post-industrial by-products include: • China clay waste • Slate overburden • Pulverised Fuel Ash (PFA) • Ground Granulated Blast Furnace Slag (GGBFS) • Air-cooled blast furnace slag • Steel slag • Furnace bottom ash (FBA) • Incinerator bottom ash • Foundry sands • Recycled glass • Recycled plastic • Tyres • Spent oil shale • Colliery spoil • Municipal Solid Waste Treatment Residues

Schedule of Evidence Required

Req.	Design Stage	Post Construction Stage
1	A copy of the relevant specification or contract clause confirming: • Recycled and secondary aggregate use criteria for the project. A letter from the design team or main contractor confirming: • The source of recycled/secondary aggregates • The amount and quality required can be obtained from this source.	Structural engineers calculations demonstrating the weight/volume of: • Total high grade aggregate used. • Total recycled and secondary aggregates used. Third party documentation as follows: Delivery notes for all recycled and secondary aggregates confirming: • Source of recycled/secondary aggregate. **AND/OR** A letter or email from the aggregate/ concrete supplier confirming that: • The aggregate supplied and used was from a recycled/secondary source • Source of recycled/secondary aggregate.

Additional Information

Relevant definitions

High Grade aggregate uses are considered to be:

Bound
- Structural frame;
- Floor slabs including ground floor slabs;
- Bitumen or hydraulically bound base, binder, and surface courses for paved areas and roads.

Unbound
- Asphalt-based or similar road surfaces
- Granular fill and capping
- Pipe bedding
- Sub bases/building foundations
- Gravel landscaping.

Crushed masonry used as fill material for general landscaping is not considered to be *high grade.* This practice is now common place on construction sites due to landfill costs.

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.

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.

Recycled aggregates: are those derived from reprocessing materials previously used in construction, e.g. crushed concrete or masonry from construction and demolition waste material.

Secondary aggregates: By-products of industrial processes that can be processed to produce secondary aggregates. Secondary Aggregates are sub-divided into manufactured and natural, depending on their source.

Issue ID	Issue Title	No. of credits available	Minimum standards
Wst 3	Recyclable Waste Storage	Up to 2	Yes

Aim

To recognise the provision of dedicated storage facilities for a building's operational-related recyclable waste streams, so that such waste is diverted from landfill or incineration.

Assessment Criteria

The following demonstrates compliance:

First credit (All educational building types)

1. A dedicated storage space to cater for recyclable materials generated by the building during occupation, compliant with the following:

    a. Clearly labelled for recycling
    b. Placed within accessible reach of the building (see Compliance Notes)
    c. In a location with good vehicular access to facilitate collections.

2. The size of the space allocated must be adequate to store the likely volume of recyclable materials generated by the building's occupants/operation. Whilst a fixed area cannot always be given, the following must be complied with as a minimum:

    a. At least $2m^2$ per $1000m^2$ of net floor area for buildings $<5000m^2$
    b. A minimum of $10m^2$ for buildings $\geq 5000\ m^2$
    c. An additional $2m^2$ per $1000m^2$ of net floor area where catering is provided (with an additional minimum of $10m^2$ for buildings $\geq 5000m^2$).

Second credit - Pre-Schools, Schools & Sixth Form Colleges only

3. There is a school recycling policy and an outline of the procedures that are in operation or that will be in place when the building is complete. As a minimum, the policy should cover:

    a. Paper and magazines, cardboard, plastics, metals, printer & toner cartridges.
    b. Where composting facilities are provided, the policy must also cover the collection of the compost unless the compost can be used on site.

Compliance Notes	
New Build	There are no additional or different criteria to those outlined above specific to new-build projects.
Refurbishment	There are no additional or different criteria to those outlined above specific to refurbishment projects.
Extensions to existing buildings	Where there are facilities within the existing building, these can be used to assess compliance. The scope of these facilities must be adequate to cater for the total volume of predicted waste from the new and existing buildings.

Multiple building assessments and buildings part of a wider estate	Where the assessment applies to one or a number of buildings, possibly as part of a wider estate, then a dedicated centralised storage space sized to accommodate the likely amount of recyclable materials for all buildings will comply with the requirements. Building areas that do not generate any operational waste, e.g. swimming pool or sports hall, can be excluded.
Fit Out Only	There are no additional or different criteria specific to fit-out only assessments, except where the assessment stakeholder is a site-based tenant, who occupies a unit/floor within a larger development and uses central or common storage facilities (provided for by a landlord), then such facilities can be used to assess compliance.
Accessible reach of the building	Typically 'accessible reach' is defined in BREEAM as within 20m of a building entrance. In some circumstances, depending on the size of the building, site restrictions or tenancy arrangements, it may not be possible to meet a 20m requirement. If it is the opinion of the assessor that it is not feasible to meet this 20m requirement then they can use their judgement to determine if the facility is in an easily accessible location for building occupants and vehicle collection and to state their reasons in the assessment report.
Individual Recycling Bins	Individual recycling bins located at convenient locations throughout the building are necessary to maximise recycling rates. On their own, however, these are not sufficient to obtain this credit.
Internal storage areas	Where the facilities are situated internally, vehicular gate heights/widths and manoeuvring and loading space must be sized correctly to ensure ease of access for vehicles collecting recyclable materials.
General waste	The area for recyclable materials storage must be provided in addition to areas and facilities provided for dealing with general waste and other waste management facilities, e.g. compactors and balers.
Recycling policy & procedures	The person(s) providing this information may vary; it could typically be the headteacher/principal, school governors, premises manager, waste contractors or other relevant authorised body/individual.

Schedule of Evidence Required

Req.	Design Stage	Post Construction Stage
All	Marked-up building/site plan and/or copy of the specification confirming: • The location of the dedicated recyclable storage area • Storage area for general waste • The area (m^2) of the storage space(s) • Description of the labelling. **Pre-Schools, schools & sixth form only** A copy of the school's recycling policy and documentation outlining the recycling procedures. **OR** A written commitment from the school, or relevant authorising body, to develop and implement a recycling policy and appropriate operational procedures.	Assessor's building/site inspection and photographic evidence confirming: • The location, size and capacity of the storage provision • Labelling of the dedicated facilities. **Pre-Schools, schools & sixth form only** Assessor's building/site inspection and photographic evidence confirming: • Recycling procedures are operational in accordance with the policy. **OR** A written commitment from the school to develop and implement a recycling policy and appropriate operational procedures.

Additional Information

Relevant Definitions
None.

The following footprint dimensions can act as a guide when determining size and accessibility criteria for the recyclable storage space:

- **Compactor dimensions:** about the size of one car parking bay; 4.8 x 2.4m
- **Skip:** The footprint of an 8 and 12 cubic yard skip measures 3.4m x 1.8m, therefore allow a minimum of 2.0m width and 4.0m length or $8m^2$ area for the storage and access of such containers
- **Wheeled bins:** 360 litre = 0.86m x 0.62 / 660L= 1.2m x 0.7m / 1100L = 1.28m x 0.98m
- **Roll-on-roll-off containers:** allow a minimum of 6.1m x 2.4m.
- **Vehicle access:** The following are dimensions for lorry types that are typically used to collect waste. Therefore gate height/widths should not be smaller than these measurements:
    - **Dustcart:** medium capacity; length = 7.4m Height = 4m width 3.1m
    - **Skip lorry:** length = 7m Height = 3.35m width 3.1m

Consideration must also be given to any other types of vehicle requiring access to this area, e.g. lorries for roll on/off containers.

Issue ID	Issue Title	No. of credits available	Minimum standards
Wst 4	Compactor / Baler	1	No

Aim

To recognise and encourage the provision of facilities which enable efficient and hygienic waste sorting and storage.

Assessment Criteria

The following demonstrates compliance:

Higher Education buildings only

1. A static waste compactor or baler is installed and situated in a service area or dedicated waste management space.

2. At least one water outlet is provided for each waste sorting and/or storing facility.

3. The recyclable waste storage criteria of BREEAM issue WST 3 have been met.

Compliance Notes	
New Build	There are no additional or different criteria to those outlined above specific to new-build projects.
Refurbishment	There are no additional or different criteria to those outlined above specific to refurbishment projects.
Extensions to existing buildings	There are no additional or different criteria to those outlined above specific to the assessment of extensions to existing buildings.
Fit Out only	There are no additional or different criteria to those outlined above specific to fit-out-only assessments.
Shared Facilities	For a building consisting of a number of small units, each ≤200m^2 floor area, shared facilities that meet the above criteria for the building as a whole are sufficient to achieve this credit.
Limited space or vehicle access	For developments that have limited space for static installations, the credit can be assessed on the basis of the provision of adequate space for a smaller portable compactor or baler.
Buildings within a campus	Where the higher education building assessed is located on a new or existing campus, a compliant centralised waste compactor / baler common to all buildings on campus can be used towards the achievement of this credit.

Schedule of Evidence Required

Req.	Design Stage	Post Construction Stage
1 - 2	Marked-up design plan and/or a copy of the specification confirming: • Provision of waste compactor/baler • Location and size of space for waste compactor/baler • Water outlet Manufacturer/supplier literature confirming • The type of compactor/baler specified.	Assessor's building/site inspection and photographic evidence confirming: • The installation of the compactor/baler (or space for installation for speculative developments) • Installation of a water outlet • The location, size and capacity of the recyclable storage provision (as required for compliance with WST 3)
3	As defined in the schedule of evidence for BREEAM issue WST 3.	As defined in the schedule of evidence for BREEAM issue WST 3.

Additional Information

Relevant definitions

Waste compactor or baler: A machine that is designed to compress waste streams in order to improve storage and transport efficiency.

The requirement to achieve the credit for storage of recyclable materials is set in order to encourage the minimisation of the assessed development's waste streams by encouraging a more integrated approach to the issue of waste management, recycling and disposal. The provision of adequate recycling and waste management facilities helps to ensure that this objective can be achieved.

Compacting dry waste can significantly reduce the volume of waste sent to landfill. Furthermore, whether for recycling or landfill, compacting waste at source will reduce the number of trips required for the collection and delivery of the waste and therefore result in reduced fuel consumption and vehicle emissions. Reduced vehicle movements will also provided social and health & wellbeing benefits to the surrounding community and economic benefits to the building occupier.

Issue ID	Issue Title	No. of credits available	Minimum standards
Wst 5	Composting	1	No

Aim

To encourage the provision of facilities that help facilitate the reduction in volume of compostable organic waste going directly to landfill during the building's operation.

Assessment Criteria

The following demonstrates compliance:

Higher Education buildings only

1. A vessel is installed on site for composting suitable food waste resulting from the building's daily operation and use.

2. There is adequate space for storing segregated food waste and composted organic material.

3. At least one water outlet is provided for cleaning in and around the facility.

OR

4. Where there are space or access limitations on site, the following demonstrates compliance:

    a. There is a dedicated segregated space for storing compostable food waste prior to collection and delivery to an alternative composting facility.
    b. At least one water outlet is provided for cleaning in and around the facility

Compliance Notes	
New Build	There are no additional or different criteria to those outlined above specific to new-build projects.
Refurbishment	There are no additional or different criteria to those outlined above specific to refurbishment projects.
Extensions to existing buildings	There are no additional or different criteria to those outlined above specific to the assessment of extensions to existing buildings.
Fit Out Only	There are no additional or different criteria to those outlined above specific to fit-out-only assessments.
Building within a campus	Where the higher education building assessed is located on a new or existing campus, compliant centralised composting facilities common to all buildings on campus can be used towards the achievement of this credit.
Storage Capacity	No criteria are defined for the type of vessel or storage capacity required as this will be determined by the end user and predicted volumes of organic compostable waste. The assessor should be satisfied that, within reason, the installation is adequate for the size of development, bearing in mind the likely quantity of organic waste that will be produced by the development.

Schedule of Evidence Required

Req.	Design Stage	Post Construction Stage
1-4	Marked-up design plan and/or a copy of the specification confirming (as appropriate): • Specification of composting vessel • Location and size of space for vessel and storage of waste/compost • Water outlet.	Assessor's building/site inspection and photographic evidence confirming: • The installation of the vessel • The provision of adequate storage space/facilities • Installation of a water outlet If appropriate, a letter from the occupier or service provider confirming: • Location of the off-site facility where compostable material will be delivered. • The procedure and frequency for collecting the compostable material.

Additional Information

Relevant definitions
None.

11.0 Land Use and Ecology

Issue ID	Issue Title	No. of credits available	Minimum standards
LE 1	Reuse of Land	1	No

Aim

To encourage the reuse of land that has been previously developed, and discourage the use of previously undeveloped land for building.

Assessment Criteria

The following demonstrates compliance:

1. At least 75% of the proposed development's footprint is on an area of land which has previously been *developed* for use by industrial, commercial or domestic purposes in the last 50 years.

Compliance Notes	
New Build	There are no additional or different criteria to those outlined above specific to new build projects.
Refurbishment	In the case of refurbishment, the credit can be awarded by default where no new building work or infrastructure is being constructed as part of the refurbishment.
Extensions to existing buildings	Where a refurbishment includes new buildings, hard landscaping, or infrastructure, 75% of the total proposed development footprint (refurbished plus new build and/or hard landscaping and/or infrastructure) must comply with the requirement.
Infill development	New buildings developed within the boundary of existing sites do not automatically comply with the criteria. The land on which at least 75% of the new building will be sited must meet the definition of *previously developed*.
Fit Out Only	Issue not applicable for Fit Out-only assessments.
Temporary works	Undeveloped areas of the site to be used for temporary works (e.g. temporary offices/parking, material/machinery storage) must be considered as development on undeveloped land and therefore included in the calculations unless they have been defined as 'land of low ecological value' (Ecological Value and Protection issue, LE3).
Developed more than 50 years ago	Where a site has been previously developed (more than 50 years ago) but is now considered undeveloped, the credit may only be awarded on this basis if the site is deemed to be "contaminated" as defined in BREEAM issue LE2.
Playing fields	A playing field within the *construction zone* can be counted as previously developed land only if an equivalent area of playing field is reinstated within one year of the completed construction works; and where such reinstatement will not encroach on land of high ecological value as defined in Ecological Value of Land and Protection of Ecological Features issue (issue number LE3).

Schedule of Evidence Required

Req.	Design Stage	Post Construction Stage
1	Existing site plan, report or site photographs confirming: • Type and duration of previous land use. • Area (m^2) of previous land use. Proposed site plan showing; • Location and footprint (m^2) of proposed development and temporary works.	Assessor's building/site inspection or as built drawings confirming: • The footprint or orientation of the developed area has not altered from that confirmed in the design stage evidence. • Where alteration has occurred the % must be re-calculated using 'as built' plans.

Additional Information

Relevant definitions

Construction zone: For the purpose of this BREEAM issue the construction zone is defined as any land on the site which is being developed (and therefore disturbed) for buildings, hard standing, landscaping, site access, 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 will be located it must be assumed that the construction zone is the entire site.

Proposed Development: Is defined as the area of any building, hard landscaping, car park and access roads that fall within the boundary of the proposed site.

Previously Developed Land: For the purposes of this issue, BREEAM uses the definition from Planning Policy Statement 3[87] which defines previously developed land as that which is or was occupied by a permanent structure, including the curtilage of the developed land and any associated fixed surface infrastructure.

The definition includes:

a. Defence buildings

The definition excludes:

a. Land that is or has been occupied by agricultural or forestry buildings.
b. Land that has been developed for minerals extraction or waste disposal by landfill purposes where provision for restoration has been made through development control procedures.
c. Land in built-up areas such as parks, recreation grounds and allotments which, although may feature paths, pavilions and other buildings, have not been previously developed.
d. Land that was previously developed but where the remains of the permanent structure or fixed surface structure have blended into the landscape in the process of time (to the extent that it can reasonably be considered as part of the natural surroundings).

Issue ID	Issue Title	No. of credits available	Minimum standards
LE2	Contaminated Land	1	No

Aim

To encourage positive action to use contaminated land that otherwise would not have been remediated and developed.

Assessment Criteria

The following demonstrates compliance:

1. The site is deemed to be *significantly contaminated* as confirmed by a contaminated land specialist's site investigation, risk assessment and appraisal identifying:

    a. the degree of contamination
    b. the contaminant sources/types
    c. the options for remediating sources of pollution which present an unacceptable risk to the site.

2. The client or contractor confirms that remediation of the site will be carried out in accordance with the remediation strategy and its implementation plan.

Compliance Notes	
New Build	There are no additional or different criteria to those outlined above specific to new build projects.
Refurbishment	There are no additional or different criteria to those outlined above specific to refurbishment projects.
Extensions to existing buildings	There are no additional or different criteria to those outlined above specific to the assessment of extensions to existing buildings.
Fit Out Only	Issue not applicable for Fit out-only assessments.
Prior Decontamination	The credit can only be awarded where remediation has taken place to enable current development of the site for the assessed building, or part of a larger phased development that includes the assessed building (see below). The credit is not achievable for instances where historical remediation and development of the site has occurred outside the scope of the current development proposals.
Large sites split into smaller plots	Where a large site has been decontaminated and is then packaged up into smaller plots of land for individual buildings (possibly as part of a phased development strategy), the credit can be awarded regardless of the plot location of the assessed building. This is on the condition that the whole site could not have been developed without remediation work taking place.
Health and Safety-related decontamination	Contaminated land that has been decontaminated solely for health and safety reasons (rather than for the specific purpose of re-development) does not comply.

Asbestos	Where the only decontamination required is for the removal of asbestos within an existing building fabric, this cannot be classified as contaminated land. However, where asbestos is found to be present in the ground this will be classed as contamination for the purposes of assessing this issue.

Schedule of Evidence Required

Req.	Design Stage	Post Construction Stage
1	A copy of the specialist's land contamination report confirming: • The degree, type and sources of site contamination. • The options for re-mediating the site. Existing site plan(s) showing: • Location of areas contaminated and to be remediated in relation to any proposed development.	The evidence required at the post construction stage is the same as for a design stage assessment.
2	A letter from the main contractor or remediation contractor confirming: • The remediation strategy for the site. • Summary details of the implementation plan. If a contractor has not yet been appointed, a letter from the client, or their representative confirming: • That the appointed contractor will undertake necessary remediation works to mitigate the risks identified in the specialist report.	A copy of the verification report (or relevant sections of the report) confirming: • Description of remedial works undertaken. • Description of relevant *pollution linkages* addressed*. * This may not be applicable where the contaminant is a non-native invasive plant species.

Additional Information

Relevant definitions

Contaminant: Is defined as any solid, liquid or gaseous material in, or on the ground to be covered by the building, which is classed as a hazard and therefore presents an unacceptable risk to human health and the environment. The definition also includes land significantly infested by *non-native invasive plant species* (see below).

Significant contamination: For the purposes of this issue, significant contamination is contamination compliant with the above and that, without remediation, development of the site is not possible.

Remediation: Activity undertaken to prevent, minimise, remedy or mitigate the risk caused by contaminated land to human health or the environment.

Non-native invasive plant species: Are non-indigenous species that adversely affect the habitats they invade economically, environmentally or ecologically. For the purposes of BREEAM this currently includes Japanese Knotweed and Giant Hogweed only. Further information on the control and disposal and how this fits into the legislative framework relating to such species can be obtained from DEFRA.

Pollution Linkages: A relevant pollutant linkage is one that has been identified during the risk assessment stage as representing unacceptable risks to human health or the environment.

Issue ID	Issue Title	No. of credits available	Minimum standards
LE3	Ecological Value of Site and Protection of Ecological Features	1	No

Aim

To encourage development on land that already has limited value to wildlife and to protect existing ecological features from substantial damage during site preparation and completion of construction works.

Assessment Criteria

The following demonstrates compliance:

1. Land within the *construction zone* is defined as 'land of low ecological value' using either:

    a. BREEAM checklist A4 **OR**
    b. A *suitably qualified ecologist* who has identified the land as being of 'low ecological value' within an ecological assessment report, based on a site survey.

2. All existing features of ecological value surrounding the construction zone and site boundary area are adequately protected from damage during clearance, site preparation and construction activities as listed below:

    - Trees of over 100 mm trunk diameter, and/or of significant ecological value, are protected by barriers. Barriers must prohibit construction works in the area between itself and the tree trunk. Minimum distance between tree trunk and barriers must be either the distance of branch spread or half tree height, whichever is the greater.
    - In all cases trees must be protected from direct impact and from severance or asphyxiation of the roots.
    - Hedges and natural areas requiring protection must either have barriers erected and be protected, or, when remote from site works or storage areas, be protected with a prohibition of construction activity in their vicinity.
    - Watercourses and wetland areas are to be protected by cut-off ditches and site drainage to prevent run-off to natural watercourses (as this may cause pollution, silting or erosion).

3. In all cases, the contractor is required to construct ecological protection prior to any preliminary site construction or preparation works (e.g. clearing of the site or erection of temporary site facilities).

Compliance Notes	
New Build	There are no additional or different criteria to those outlined above specific to new build projects.
Refurbishment	A refurbishment of a building (with no new construction), must protect any existing ecological features of value. Protection includes clear exclusion procedures for construction traffic/personnel and material storage, as well as physical barriers.
Extensions to existing buildings	Where a refurbishment includes new building work or infrastructure, the land on which the new build area and its associated infrastructure (e.g. roads, pavements, car parks etc) will be situated, must comply with the criteria.

Fit Out Only	Issue not applicable for Fit out-only assessments.
No features of ecological value	Where the construction zone is defined as 'land of low ecological value' and where the surrounding site contains no features of ecological value, this credit can be awarded.
Use of a suitably qualified ecologist	Where a suitably qualified ecologist is employed and has, using their professional judgement, defined the site as land of low ecological value, this assessment/judgement overrides any assessment determined using checklist A4. The suitably qualified ecologist must base their findings on data collected from a site visit conducted at appropriate time(s) of the year, when different plant and animal species are evident. The content of the Ecology Report is to be representative of the existing site's ecology prior to the commencement of initial site preparation works (i.e. before RIBA stage K, construction to practical completion). Where the ecologist has made no on-site visit, the credit cannot be awarded. See additional guidance for definition of a suitably qualified ecologist.
Features of little or no ecological value	If a suitably qualified ecologist has confirmed that a feature has little or no ecological value, or where a tree is deemed to create a significant danger to the public or occupants by a statutory body or qualified arboriculturalist, then that feature may be exempt from the protection of ecological features requirement of this issue.
Removal of features of ecological value	If features of ecological value have been removed as part of site clearance then the development cannot achieve this credit, even if they are to be replaced as part of a new landscaping strategy.
Site clearance prior to purchase of the site	For sites that have been cleared more than five years ago, the ecological value of the site would be its present ecological value, on the basis that in the intervening five years, ecological features would have started to re-establish themselves and therefore act as an indicator of the site's ecological value. For sites that have been cleared less than five years before assessment, a suitably qualified ecologist should make an estimation of the site's ecological value immediately prior to clearance on the basis of available desktop information (including aerial photography) and the landscape type/area surrounding the site. Where it is not possible for the ecologists to determine that the site was of low ecological value prior to the site clearance then the credit must be withheld.

Schedule of Evidence Required

Req.	Design Stage	Post Construction Stage
1&2	A completed copy of checklist A4 signed and dated by the client, their representative or a design team member e.g. architect. **AND** One of the following: A plan and/or site photographs of the existing site highlighting any ecological features **OR** A copy of the ecologist's report containing: • Confirmation that the land within the construction zone is of low ecological	The evidence required at the post construction stage is the same as for a design stage assessment.

	value. • A description of any ecological features within the site or on the site boundary. • Date(s) of site survey(s). A completed, signed copy of sections A and B of checklist A6 'Guidance for relating ecology reports to BREEAM' to confirm the ecologist's professional status **OR** A copy of the ecologist's report containing the information in sections A and B from the above.	
2&3	A copy of the relevant section of the contract specification confirming: • Requirement to protect all identified features of ecological value. • Scope of protection measures required. • Protection measures implemented prior to commencement of site activities.	Assessor site inspection report **OR** ecologist's report confirming: • The boundary of the site and the construction zone has not been altered. • Where applicable, all existing ecological features still remain.

Additional Information

Relevant definitions

Construction zone: For the purpose of this BREEAM issue the construction zone is defined as any land on the site which is being developed (and therefore disturbed) for buildings, hard standing, landscaping, site access, 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 will be located it must be assumed that the construction zone is the entire site.

Suitably qualified ecologist (SQE): An individual achieving all the following items can be considered to be "suitably qualified" for the purposes of a BREEAM assessment:

1. Holds a degree or equivalent qualification (e.g. N/SVQ level 5) in ecology or a related subject.

2. 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.

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

Peer review: Is defined as the process employed by a professional body to demonstrate that potential or current full members maintain a standard of knowledge and experience required to ensure compliance with a code of conduct and professional ethics.

Full members of the following organisations, who meet the above criteria, are deemed suitably qualified ecologists for the purposes of BREEAM:

- Association of Wildlife Trust Consultancies (AWTC)
- Chartered Institution of Water and Environmental Management (CIWEM)
- Institute of Ecology and Environmental Management (IEEM)
- Institute of Environmental Management and Assessment (IEMA)
- Landscape Institute (LI)

Where a suitably qualified ecologist is verifying an Ecology Report produced by another ecologist who does not meet the SQE criteria, they must, as a minimum, have read and reviewed the report and confirm in writing that they have found it to:

a. represent sound industry practice
b. report and recommend correctly, truthfully and objectively
c. be appropriate given the local site conditions and scope of works proposed
d. avoid invalid, biased and exaggerated statements.

Additionally, written confirmation from the third party verifier that they comply with the definition of a *Suitably Qualified Ecologist* is required.

Issue ID	Issue Title	No. of credits available	Minimum standards
LE4	Mitigating Ecological Impact	2	Yes

Aim

To minimise the impact of a building development on existing site ecology.

Assessment Criteria

The following demonstrates compliance:

1. **One credit** where the change in ecological value of the site is less than zero and equal to or greater than minus nine plant species i.e. a minimal change.

2. **Two credits** where the change in ecological value of the site is equal to or greater than zero plant species i.e. no negative change.

The change in ecological value of the site is calculated using **EITHER** of the following:

3. Determine the following information and input this data in to Ecology calculator 1 within the spreadsheet tool:

    a. Plot type(s) that define the landscape of the assessed site, in its existing pre-developed state and proposed state (see additional guidance)
    b. Areas (m^2) of the defined existing and proposed plot types.

OR

4. Where a *suitably qualified ecologist* has been appointed and, based on a site survey, they confirm the following and the assessor or ecologist inputs this data in to the Ecology calculator 2:

    a. Actual plot/habitat types that define the landscape of the assessed site in its existing pre-developed state and proposed state
    b. Area (m^2) of each plot/habitat type
    c. Number of different plant species found within each plot type.

Compliance Notes	
New Build	There are no additional or different criteria to those outlined above specific to new build projects.
Refurbishment	There are no additional or different criteria to those outlined above specific to refurbishment projects.
Extensions to existing buildings	There are no additional or different criteria to those outlined above specific to the assessment of extensions to existing buildings. Refer also to the note below on infill developments.
Fit Out Only	Issue not applicable for Fit out-only assessments.

Completing Ecology Calculator 1	First, define the landscape type (based on the typology of the surrounding sites, Table 20 General Landscape Types). This category is unlikely to change through the development, although it may in some cases, e.g. when a disused site is developed as part of a master plan for a large multi-use or multi-building development/regeneration project. Then, define and calculate the area (m^2) of each vegetation-plot type (Table 21 Vegetation Plot Types) and building or hard landscaped area, both before and after development, for the site. Once the data is entered, the Ecology Calculator 1 will indicate the indicative change in ecological value. The result must be used to award the credits.
Number of plant species	BREEAM measures ecological value using number of plant species. The plant species figures for each land type are programmed into the Ecology Calculator tool 1. These figures are based on national figures from the Countryside Survey prepared for the Digest of Environmental Statistics[88] (see Table 22 Number of plant species by plot for different landscape types). Where an ecologist has been appointed actual number of plant species (before and after construction), based on the ecologists site survey should be used to determine the change in ecological value.
Wildlife garden planting	In the 'change of ecological value' table, 'garden planting (typical)' and 'wildlife garden planting' will always record a score of zero, unless a suitably qualified ecologist has been appointed: whereby they will make the distinction between 'typical' and 'wildlife' garden planting species and record 'actual' species numbers.
Derelict Sites	The ecological value of derelict sites is time dependent (Table 22 Number of plant species by plot for different landscape types); a linear scale has been used to determine intermediate values between zero ecological value at 1 year from dereliction/demolition to a value at 30 years based on marginal upland figures. This presents a worst case figure which can be amended on the advice of a suitably qualified ecologist.
Assessment of a single development on a larger site	Where the assessment is of a single building that forms part of a larger site development and the landscaping and ecological features form a common part of the whole site, for the purpose of assessing this issue the plot types and areas for the entire site must be used.
Infill developments on existing occupied site	Where a development is an infill (or new building) on an existing occupied site, then the *construction zone* for the new building would be the area of site assessed for the purposes of this issue.
Site clearance prior to purchase of the site	Refer to the compliance note in LE3 on this issue.
Green Roofs	The contribution of species from a Green roof can only be incorporated where a suitably qualified ecologist has been appointed.

Schedule of Evidence Required

Req.	Design Stage	Post Construction Stage
First & Second Credit		
1,2 & 3	Existing and proposed site plans and, if required, maps and aerial photographs confirming: • Landscape and vegetation plot types • Area (m^2) of vegetation plot types **AND** A completed copy of Ecology Calculator 1.	The evidence required at the post construction stage is the same as for a design stage assessment. Plus: Assessor's/ecologist's building/site inspection confirming: • Post construction vegetation plot types and areas are in accordance with design stage evidence.
1,2 & 4	A copy of the suitably qualified ecologist's report confirming prior to and after the development: • Landscape and vegetation plot types • Area (m^2) of vegetation plot types **AND** A completed, signed copy of checklist A6 – Relating ecology reports to BREEAM **OR** a copy of the ecology report containing the information outlined in checklist A6. **AND** A completed copy of Ecology Calculator 2.	

Additional Information

Relevant Definitions

Construction zone: As defined for issue LE3 – Ecological Value of site AND Protection of ecological features

Suitably qualified ecologist (SQE): As defined for issue LE3 – Ecological Value of site AND Protection of ecological features

Table 20 General Landscape Types

Pastoral	Mainly grasslands.
Arable	Land dominated by cereals and other arable crops, as well as intensively managed grasslands.
Marginal Upland	Areas which are on the periphery of the uplands, and which are dominated by mixtures of low intensity agriculture, forestry and semi-natural vegetation.
Upland	Land generally above a height suitable for mechanised farming and frequently dominated by semi-natural vegetation.
Building & Derelict Land	Land currently or previously occupied by buildings.
Urban Mosaic	A complex mix of habitats located within cities, towns, or villages, which will include; buildings, hard standing, pockets of disused land and scrub, and areas of managed green spaces, such as gardens, allotments, and parkland. Parklands can be characterised as being accessible to the public and will usually be fairly intensively managed spaces, consisting of a matrix of grassland (grazed or mown) with scattered trees at various densities and areas of dense planting. This landscape type is to be used only when no other landscape type in the table is more appropriate / predominates.

Table 21 Vegetation Plot Types

Crops/weeds	Mostly highly disturbed vegetation of arable fields and their boundaries; includes cereal and vegetable crops.
Tall grassland/herb	Typical vegetation of overgrown lowland field boundaries, ditches and roadside verges.
Fertile grass	The bulk of agriculturally improved grasslands, intensive pasture and silage crops; but also includes mown areas of improved grasslands for recreational and amenity purposes, as well as re-sown roadside verges.
Infertile grass	A diverse group of semi-improved and semi-natural grasslands; includes acidic to basic, wet to dry grasslands, and tall-herb vegetation mainly present in the lowlands; often found on stream sides and roadside verges.
Lowland wooded	Includes wooded vegetation of hedges and broadleaved woods in the lowlands.
Upland wooded	A varied group of acidic vegetation types usually associated with upland woods, including: semi-natural woodland; conifer plantations; bracken and wooded streamsides.
Moorland grass/mosaic	Typically grazed moorland vegetation, including extensive upland acidic and peaty grassland, and species-rich but very localised flushes.
Heath/bog	Mostly heather moorland, blanket bog and montane heath, but also lowland heath and raised bog.
Wildlife garden planting	Garden planting that uses native species and/or those that have a known attraction or benefit to local fauna, based on the advice of a suitably qualified ecologist.

Table 22 Number of plant species by plot for different landscape types

	Landscape Types									
Types of Plot	**Arable**	**Pastural**	**Marginal Upland**	**Upland**	**Existing Building/Hard Landscaped Areas**	**Urban Mosaic**	**Derelict Land <1 Years**	**Derelict Land < 10 Years**	**Derelict Land < 20 Years**	**Derelict Land <= 30 Years**
Crop Weeds	5.4	8.3	-	-	-	-	-	-	-	-
Tall Grassland/Herb	12.7	15.0	-	-	-	17.6	0	6.3	15.8	21.1
Fertile Grassland	11.6	12.7	15.3	-	-	11.6	0	4.6	11.5	15.3
Infertile Grassland	17.1	17.6	21.1	-	-	17.6	0	6.3	15.8	21.1
Lowland Wooded	12.9	12.5	-	-	0	13.8	-	-	-	-
Upland Wooded	-	12.7	13.8	20.4	0	13.8	-	-	-	-
Moorland Grass/Mosaic	-	2.0	20.4	21.0	-	-	-	-	-	-
Heath/Bog	-	-	14.3	20.0	-	-	-	-	-	-
Hard Landscaping	0	0	0	0	0	0	0	0	0	0
Buildings	0	0	0	0	0	0	0	0	0	0
Garden Planting (typical)	-	-	-	-	0	0	0	0	0	0
Wildlife Garden Planting*	-	-	-	-	0	0	0	0	0	0

- Insufficient data to produce national averages, as not all vegetation plot types are found in all landscaped types.
* Only where the rule concerning wildlife garden planting in Table 21 Vegetation Plot Types has been met can actual species values be used.

Calculating the change and increase in ecological value

BREEAM calculates the change in ecological value by comparing the diversity (number and area) of plant species on the site pre and post construction. The ecological value of the site is expressed as an area-weighted average of plant species for the site's landscape type. This enables BREEAM to use this as an indicator of the proposed development's impact on the site's existing ecological value.

A simple example of the calculation is outlined below.

1. Calculate the ecological value of a previously developed existing site:

   A 2065m^2 existing site consists of the following types of land:

   a. 1865 m^2 hard landscaping = 0 species
   b. 200m^2 urban mosaic - infertile grassland = 17.6 species (Table 22 Number of plant species by plot for different landscape types).

   The ecological value of the existing site is calculated as follows, for each plot type;

   - Number of species on plot type x plot type area as % of total area.

   Therefore, for our example site:

   a. Hard landscaping: {(0 species x (1865m^2/2065m^2)} = 0 species
   b. urban mosaic-infertile grassland: {(17.6 species x (200m^2/2065m^2)} = 1.70 species
   c. Ecological value of the existing site = 0 + 1.70 = 1.70 species

2. Calculate the ecological value of the proposed site:

   The 2065m^2 post-construction site consists of the following types of land:

   a. 1375m^2 of building = 0 species.
   b. 550m^2 of hard landscaping = 0 species
   c. 140 m^2 has remained as urban mosaic-infertile grassland = 17.6 species

   The ecological value of the proposed site is as follows:

   a. Building: {(0 species x (1375m^2/2065m^2)} = 0 species
   b. Hard landscaping: {(0 species x (550m^2/2065m^2)} = 0 species
   c. Urban mosaic-infertile grassland: {(17.6 species x (140m^2/2065m^2)} = 1.19 species
   d. Ecological value of the proposed site = 0 + 0 + 1.19 = 1.19 species

The ecological impact is the difference between the two ecological values:

Change in ecological value: 1.19 – 1.70 = - 0.51 species

Therefore, for this example 1 credit is achieved.

Issue ID	Issue Title	No. of credits available	Minimum standards
LE5	Enhancing Site Ecology	3	No

Aim

To recognise and encourage actions taken to maintain and enhance the ecological value of the site as a result of development.

Assessment Criteria

The following demonstrates compliance:

First credit

1. A *suitably qualified ecologist* (SQE) has been appointed to report on enhancing and protecting the ecology of the site and:

    a. The SQE provides an Ecology Report with appropriate recommendations for protection and enhancement of the site's ecology.
    b. The report is based on a site visit/survey by the SQE prior to the commencement of initial site preparation works.

2. The general recommendations of the Ecology Report for enhancement and protection of site ecology have been, or will be, implemented.

Second credit

1. The first credit is achieved.

2. The recommendations of the Ecology Report for enhancement and protection of site ecology have been implemented, and the *suitably qualified ecologist* confirms that this will result in an increase in ecological value of the site up to (but not including) 6 plant species.

3. The increase in plant species has been calculated using Ecology calculator 2, using actual species numbers.

Third credit

1. The first credit is achieved.

2. The *recommendations* of the Ecology Report for enhancement and protection of site ecology have been implemented, and the suitably qualified ecologist confirms that this will result in an increase in ecological value of the site of 6 plant species or greater.

3. The increase in plant species has been calculated using Ecology calculator 2, using actual species numbers.

Compliance Notes	
New Build	There are no additional or different criteria to those outlined above specific to new build projects.
Refurbishment	There are no additional or different criteria to those outlined above specific to refurbishment projects.
Extensions to existing buildings	There are no additional or different criteria to those outlined above specific to the assessment of extensions to existing buildings.
Fit Out Only	Issue not applicable for Fit out-only assessments.
Timing of Ecologist Report	It is recommended that the suitably qualified ecologist is appointed to carry out site surveys of existing site ecology, on which their report is based, or to provide verification where the report is prepared by others, at the design brief stage (RIBA Stage B or equivalent) in order to facilitate and maximise potential ecological enhancement.
General recommendations	'General' recommendations for enhancing and protecting the ecological value of the site are to include, and go beyond, compliance criteria for all current EU and UK legislation relating to protected species and habitats. These 'general' recommendations may include ecological recommendations as detailed in the definitions.
Guidance for ecologists and assessors	Please refer to Checklist A6 – Relating ecology reports to BREEAM, section D for assistance in assessing and interpreting the assessment criteria for this BREEAM issue.
Plant species	Only native floral/plant species, and/or those contributing to a local or UK Biodiversity Action Plan or those with a known attraction or benefit to local fauna can be considered for the purpose of increasing the number of species on site, as well as general enhancement. The Natural History Museum has an online *Postcode Plants Database* which generates lists of native plants and wildlife for any specified postal district in the UK. http://www.nhm.ac.uk/nature-online/life/plants-fungi/postcode-plants/index.html
No ecological survey completed or construction works have commenced	Where it is not possible to determine 'actual' number of species per vegetation plot type, either because an on-site ecological survey has not been conducted, or, because construction works have already commenced, the second and third credits cannot be achieved.

Schedule of Evidence Required

Req.	Design Stage	Post Construction Stage
First Credit		
1	A copy of the ecologist's report containing: • Details and scope of the site survey. • Information as outlined in checklist A6 – Relating ecology reports to BREEAM. **OR** A copy of the ecologist's report containing a completed, signed copy of checklist A6.	The evidence required at the post construction stage is the same as for a design stage assessment.

2	Proposed site plan highlighting implementation of the ecologist enhancement recommendations. **AND** One of the following: A copy of the relevant section of the specification requiring the main contractor to implement the SQE's recommendations for protection and enhancement **OR** A letter from the client or design team member confirming: • That the specification will require the main contractor to implement the ecologist's recommendations.	Assessor site inspection report and photographic evidence confirming that the ecologist's recommendations have been implemented. For large mixed-use/multi-building developments, where the whole site has not been completed and ecological enhancements have not been added, or where features are being added at a later date in an appropriate planting season: • A copy of the contract/specification or a letter from the main contractor confirming when the planting will be complete. This must be within 18 months from completion of the development.
Second & Third Credit		
1-3	Evidence as outlined above, confirming compliance with the first credit. A copy of the SQE's report containing the information outlined in checklist A6 – Relating ecology reports to BREEAM. **OR** A copy of the SQE's report containing a completed, signed copy of checklist A6. **AND** A completed copy of Ecology Calculator 2.	Evidence (as outlined above) confirming compliance with the first credit.

Additional Information

Relevant Definitions

Suitably qualified ecologist (SQE): As defined for BREEAM Issue LE3.

Ecological recommendations are defined as measures adopted to enhance the ecology of the site, which may include:

- The planting of native species or those with a known attraction or benefit to local wildlife
- The adoption of horticultural good practice (e.g. no, or low, use of residual pesticides)
- The installation of bird, bat and/or insect boxes at appropriate locations on the site
- Development of a full Biodiversity Management Plan including avoiding clearance/works at key times of the year (e.g. breeding seasons)
- The proper integration, design and maintenance of SUDs and Green Roofs, community orchards etc.

Only native floral species or those with a known attraction or benefit to local wildlife can be considered for the purpose of enhancing the ecological value of the site.

Issue ID	Issue Title	No. of credits available	Minimum standards
LE6	Long Term Impact on Biodiversity	2	No

Aim

To minimise the long term impact of the development on the site's, and surrounding area's, biodiversity.

Assessment Criteria

The following demonstrates compliance:

One credit can be awarded where there is a commitment to achieve the mandatory criteria and at least two of the additional criteria (listed below).

Two credits can be awarded where there is a commitment to achieve the mandatory criteria and at least four of the additional criteria (listed below).

Mandatory Criteria

1. A *suitably qualified ecologist* (SQE) has been appointed prior to commencement of activities on site.

2. The *suitably qualified ecologist* confirms that all relevant UK and EU legislation relating to protection and enhancement of ecology has been complied with during the design and construction process.

3. A landscape and habitat management plan, appropriate to the site, is produced covering at least the first five years after project completion. This is to be handed over to the building occupants and includes:
   - Management of any protected features on site
   - Management of any new, existing or enhanced habitats
   - A reference to the current or future site level or local Biodiversity Action Plan.

Additional Criteria

1. The contractor nominates a 'Biodiversity Champion' with the authority to influence site activities and ensure that detrimental impacts on site biodiversity are minimised in line with the recommendations of a suitably qualified ecologist.

2. The contractor trains the site workforce on how to protect site ecology during the project. Specific training should be carried out for the entire site workforce to ensure they are aware of how to avoid damaging site ecology. Training should be based on the findings and recommendations for protection of ecological features highlighted within a report prepared by a suitably qualified ecologist.

3. The contractor records actions taken to protect biodiversity and monitor their effectiveness throughout key stages of construction. The requirement commits the contractor to make such records available where publicly requested.

4. Where a new ecologically valuable habitat, appropriate to the local area, is created. This includes habitat that supports nationally, regionally or locally important biodiversity, and/or which is nationally, regionally or locally important itself; including any habitat listed in the UK Biodiversity

Action Plan (UK BAP)[89], Local Biodiversity Action Plan (LBAP), those protected within statutory sites (e.g. SSSIs), or those within non-statutory sites identified in local plans.

5. Where flora and/or fauna habitats exist on site, the contractor programmes site works to minimise disturbance to wildlife. For example, site preparation, ground works, and landscaping have been, or will be, scheduled at an appropriate time of year to minimise disturbance to wildlife. Timing of works may have a significant impact on, for example, breeding birds, flowering plants, seed germination, amphibians etc. Actions such as phased clearance of vegetation may help to mitigate ecological impacts. This additional requirement will be achieved where a clear plan has been produced detailing how activities will be timed to avoid any impact on site biodiversity in line with the recommendations of a suitably qualified ecologist.

Compliance Notes	
New Build	There are no additional or different criteria to those outlined above specific to new build projects.
Refurbishment	There are no additional or different criteria to those outlined above specific to the assessment of refurbished buildings (unless the building is listed – see below).
Extensions to existing buildings	There are no additional or different criteria to those outlined above specific to the assessment of extensions to existing buildings.
Fit Out Only	Issue not applicable for Fit out-only assessments.
Refurbishment of listed buildings	The refurbishment of a listed building may be exempt from the assessment criteria if they conflict with the need to maintain the building's listed features, or are counter to the conservation criteria. Confirmation is required from a suitably qualified ecologist that all possible criteria/enhancements have been achieved before the credit can be awarded (i.e. if no suitably qualified ecologist has been appointed then this credit cannot be awarded).
Biodiversity Champion	A Biodiversity Champion does not have to be an ecologist or ecological expert but must have sufficient authority and time on site to influence activities and ensure that they have minimal detrimental impact on biodiversity.
Local biodiversity expertise	Local biodiversity expertise should be sought at, or before, the design stage to help identify species of local biodiversity importance on site. It is likely that their recommendations will draw on the Local Biodiversity Action Plan (LBAP) where one exists.
The site and surrounding areas	The steps taken in the above criteria will depend on the nature of the site, e.g. urban sites, and the surrounding areas. It is likely that either all, or none, of the optional items will apply. Where the optional items and the mandatory item 3, the management plan, are deemed, in writing, by the appointed suitably qualified ecologist not to be applicable, all credits can be awarded. Mandatory items 1 and 2 must be met in all instances. This is likely to be the case in the majority of assessments in central town/city areas which have a high proportion of surrounding and existing development and no existing external landscaped areas within the boundary of the assessed site.
Sites of no ecological value	Where a site is deemed to have no ecological value, it is still necessary to employ a suitably qualified ecologist to achieve this credit. The ecologist must confirm that all the mandatory items (1), (2) and (3) have been achieved and provide guidance on how to achieve optional item (4). Note that in such cases, mandatory item (1) and additional requirement (4) is likely to be applicable in relation to any ecological enhancements (e.g. green roofs, bird boxes, etc.) adopted in order to achieve the Enhancing Site Ecology issue (LE5).

<table>
<tr><td>Not all additional items are applicable</td><td>Where the SQE confirms that not all additional items are applicable to the development, for example it is a city centre refurbishment on a confined site with no external areas, then the credits can be awarded accordingly:
<table>
<tr><th>No. applicable items</th><th>No. of BREEAM credits</th><th>Criteria</th></tr>
<tr><td rowspan="2">1 item</td><td>One credit</td><td rowspan="2">Meet mandatory reqs. plus applicable item</td></tr>
<tr><td>Two credits</td></tr>
<tr><td rowspan="2">2 items</td><td>One credit</td><td rowspan="2">Meet mandatory reqs. plus all applicable items</td></tr>
<tr><td>Two credits</td></tr>
<tr><td rowspan="2">3 items</td><td>One credit</td><td>Meet mandatory reqs. plus 2 applicable items</td></tr>
<tr><td>Two credits</td><td>Meet mandatory reqs. plus all applicable items</td></tr>
<tr><td rowspan="2">4 items</td><td>One credit</td><td>Meet mandatory reqs. plus 2 applicable items</td></tr>
<tr><td>Two credits</td><td>Meet mandatory reqs. plus all applicable items</td></tr>
</table></td></tr>
<tr><td>Ground maintenance & management plan</td><td>In schools and pre-schools, the management plan should include guidelines for ground maintenance. Without this there may be a tendency for grounds maintenance staff to pursue a largely unchanging maintenance routine. This may not be favourable to biodiversity on site, and may reduce scope for pupil involvement and opportunities for change.</td></tr>
</table>

Schedule of Evidence Required

Req.	Design Stage	Post Construction Stage
Mandatory Criteria		
1&2	The SQE report or letter confirming: • That they were appointed prior to commencement of activities on site. • All relevant UK and EU legislations will be complied with. **AND** A completed, signed copy of checklist A6 – Relating ecology reports to BREEAM **OR** A copy of ecology report containing the information outlined in checklist A6.	A letter from the SQE confirming: • That all relevant UK and EU legislation relating to protection and enhancement of ecology has been complied with.

3	A copy of the site management plan. **OR** A copy of the specification requiring the development of plan and outlining the scope of its content. **OR** Where the timing of assessment does not permit either of the above, a letter from the client confirming: • A commitment to produce a management plan • The scope of the management plan	A copy of the site's landscape and habitat management plan.
Additional Criteria		
1	A letter from the contractor confirming: • The appointment of the biodiversity champion and their job title. • Their on site role and responsibilities. **OR** Where not yet appointed, a copy of the specification clause requiring the appointment of a biodiversity champion.	A copy of the relevant sections of the site log book, highlighting: • Details of any action/events taken by the biodiversity champion. If no actions required/taken, this should be confirmed in the log book.
2	Training schedule or letter of confirmation from the contractor committing to provide relevant training. **OR** Where not yet appointed, a copy of the specification clause requiring the training of the site's workforce.	A record of training undertaken by the site workforce confirming: • Who delivered & developed the training • The scope of the training delivered.
3	A letter from the contractor confirming: • Monitoring and reporting criteria for the development. • The records will be publicly available if and when requested. **OR** Where not yet appointed, a copy of the specification clause outlining the contractor's monitoring and reporting criteria.	A copy of the relevant sections of the site log book, highlighting: • Records of monitoring and actions taken to protect biodiversity. • Records and outcome of any requests to view such information.
4	A copy of the proposed site plan highlighting the new ecologically valuable habitat. A SQE's report or letter confirming that the habitat supports the relevant biodiversity action plan(s)	Assessor's (or SQE's) site inspection report and photographic evidence confirming the existence of the proposed habitat.

5	The SQE's report or letter confirming: • Wildlife on site that needs to be accounted for in programming works. • Actions required with respect to programming site works to minimise disturbance. A copy of the contractor's main programme of works. **OR** A copy of the relevant section of the main contract confirming: • The programme of site works will minimise disturbance to wildlife in accordance with SQE's recommendations.	A letter from the SQE, or a copy of their report confirming: • Site works executed in a manner that minimised disturbance to wildlife in accordance with their recommendations.

Additional Information

Relevant definitions

Suitably qualified ecologist (SQE): As defined for Issue LE3 – Ecological Value of site AND Protection of ecological features

Biodiversity: Is defined as the variety of life on earth. It includes all species, animal, plants, fungi, algae, bacteria and the habitats that they depend upon.

Biodiversity Action Plan: A plan which sets specific, measurable, achievable, realistic and time bound conservation targets for species and habitats. The UKBAP website www.ukbap.org supports the implementation of the UK Biodiversity Action Plan (UK BAP) on behalf of the UK Biodiversity Partnership and the UK Government.

Steps to produce a BAP are outlined in the UK Business and Biodiversity Resource Centre website, hosted by Earthwatch Institute Europe http://www.businessandbiodiversity.org under 'your sector'

Issue ID	Issue Title	No. of credits available	Minimum standards
LE7	Consultation with Students and Staff	1	No

Aim

To encourage the design team to include pupils and staff in the design of the school grounds.

Assessment Criteria

The following demonstrates compliance:

Pre-Schools, Schools and Sixth Form Colleges only

1. The design team have identified staff and pupil criteria for the school grounds, and consulted and gathered their ideas for the school ground's design.

2. The consultation included holding a number of workshops for separate groups of pupils and staff (or other comparable method) in order to determine:

    a. How the grounds could best be designed to facilitate learning
    b. How the grounds could best be designed to provide a range of social spaces appropriate to pupils' and other users' needs.

3. At least four workshops were held: two workshops with staff (including both teaching staff and ground maintenance supervisors), and two with pupils from different age groups. The findings of the workshops must influence the design and therefore must have been held before key and final design decisions were made.

4. The design team have kept pupils and staff informed of how their ideas are being taken into account in the design of the school grounds.

Compliance Notes	
New Build	For new schools where there are no identifiable staff or pupils, consultation with relevant people/groups from the local catchment area and similar schools in the area must be carried out in place of the above.
Refurbishment	There are no additional or different criteria to those outlined above specific to refurbishment projects.
Extensions to existing buildings	There are no additional or different criteria to those outlined above specific to the assessment of extensions to existing buildings.
Fit Out Only	Issue not applicable for Fit out-only assessments.
Further & Higher Education Colleges	This BREEAM issue is not assessed for these building types.
Pre-Schools	Only the staff and not pupils/children need to be consulted and informed for pre-school developments.

Consultation	Consultation should consider the range of needs for both social and educational use of the outdoor space. A range of sizes and types of space should be designed to facilitate different types of social interaction. Consideration should be given to how the space can facilitate learning in the range of subjects, including science, drama, maths, geography, art, physical education, history, etc. Discussion at consultation workshops could be aided by using 1:500 scale plans of the site. All views raised in the workshops should be recorded.

Schedule of Evidence Required

Req.	Design Stage	Post Construction Stage
1-4.	A copy of the design team's consultation schedule with pupils and staff confirming: • The workshop schedules & framework. • Number and dates of workshops held/proposed. • A list of actual/proposed attendees for each workshop. • Format and reporting method for keeping pupils and staff informed. Where, at the stage of interim assessment, the workshops have been held: • Minutes and actions from the workshop(s). • Proposed site plan highlighting any design solutions based on consultation.	A copy of the minutes and actions from consultation workshops. Assessor's building/site inspection and photographic evidence confirming: • Any facilities designed and constructed within the school grounds, based on the results from the consultation process. Records such as circulars, newsletters, presentations confirming: • That the staff and pupils were kept informed of how their ideas were taken into account in the design.

Additional Information

Relevant definitions
None.

Small Working Groups
It is often appropriate for the design team to suggest that the school set up a small working group, which includes both staff and pupils. Members of the group would not only take part in consultation, but would play a key role in the ongoing use, management and development of the school grounds, encouraging feelings of ownership.

Design Options
Design options may include allocating areas for pupils to design and plant themselves, perhaps taking a long-term view so that pupils might gain from planning new initiatives and from the anticipation of potential changes in successive years.

Issue ID	Issue Title	No. of credits available	Minimum standards
LE8	Local Wildlife Partnership	1	No

Aim

To encourage the design team to form a partnership with a local group that has wildlife expertise, in order to benefit from their local knowledge and ongoing support.

Assessment Criteria

The following demonstrates compliance:

Pre-Schools, Schools and Sixth Form Colleges only

1. A partnership has been set up by the design team with a local group that has wildlife expertise (e.g. local wildlife trust or similar local body) and the group has:

    a. Provided advice early in the design process regarding protecting and/or providing habitat for species of local importance on the site.
    b. Provided advice to ensure the design is in keeping with the local environment. In particular this should draw on their local knowledge of any features or species of ecological interest on or near the site.
    c. Provided or will continue to provide ongoing support and advice to the school to help them manage, maintain and develop the outdoor space in the longer term.

Compliance Notes	
New Build	There are no additional or different criteria to those outlined above specific to new build projects.
Refurbishment	There are no additional or different criteria to those outlined above specific to refurbishment projects.
Extensions to existing buildings	There are no additional or different criteria to those outlined above specific to the assessment of extensions to existing buildings.
Fit Out Only	Issue not applicable for Fit out-only assessments.
Further & Higher Education Colleges	This BREEAM issue is not assessed for these building types.
Ongoing support and advice	This could take the form of meetings several times a year with a staff/pupil working party to help them plan conservation/ecological enhancement work, or activities relating the ecology in or near the school grounds.
Local Wildlife Trust	The local wildlife trust would be a suitable body to set up a partnership with. Alternative groups may also be appropriate. The design team should find out about wildlife projects that these groups have been involved locally in order to make a decision on their suitability before entering into discussions about setting up a partnership.

Schedule of Evidence Required

Req.	Design Stage	Post Construction Stage
1	A letter of confirmation from the design team or wildlife group confirming: • Scope of the partnership. • Details and remit of the wildlife group. • A description of the process for ongoing support that the group commit to give to the partnership. • Details of meetings and actions to date.	A letter of confirmation from the design team or wildlife group detailing: • Meetings and actions carried out. • A copy of correspondence highlighting advice supplied by the wildlife group to the design team. • Scope and framework around which the group has been or will be providing ongoing support to the school. This must include a timescale for future meetings/events.

Additional Information

Relevant definitions

Local Biodiversity Action Plan (LBAP): A suitable starting point for discussion with the local wildlife group would be to ask for advice on how to take account of the Local Biodiversity Action Plan (LBAP) in the school ground's design.

12.0 Pollution

Issue ID	Issue Title	No. of credits available	Minimum standards
Pol 1	Refrigerant GWP – Building Services	1	No

Aim

To reduce the contribution to climate change from refrigerants with a high global warming potential.

Assessment Criteria

The following demonstrates compliance:

1. The building has no refrigerants **OR**
2. The refrigerants used within the building services have a GWP less than 5.

Compliance Notes	
New Build	There are no additional or different criteria to those outlined above specific to new build projects.
Refurbishment	There are no additional or different criteria to those outlined above specific to refurbishment projects.
Extensions to existing buildings	If the extended and existing building share the same building services, then these services must be assessed against the criteria regardless of whether the existing building forms a part of the assessment or not. If the extension is served by independent services, only these need be assessed against the Assessment Criteria.
Fit Out Only	The criteria apply to both new systems specified as part of a fit out and the refrigerants used in any existing systems that will remain post fit out. Any existing systems that use refrigerants with an ozone depleting potential or a global warming potential of more than 5 must have been converted to use a refrigerant with a zero ODP and GWP less than 5. Where this is not possible such systems will need to be replaced to meet the assessment criteria.
Solid refrigerant	The credit can be awarded by default where a solid refrigerant is used.
Refrigerant charge less than 5kg	The credit can be awarded where the total refrigerant charge used in the building services is less than 5kg.
Multiple split units	In the case of multiple split units, through-the-wall or other packaged units, the credit can be awarded where the **total** collective refrigerant charge is less than 5kg. If the **total** collective refrigerant charge in such systems is greater than 5kg, then the refrigerant(s) must comply with the BREEAM criteria.

Office server and comms rooms	Refrigerants used in services for typical office server and comms rooms cannot be excluded from the assessment. Where air conditioning equipment is provided, the equipment may not be able to achieve this credit as smaller systems often require refrigerants with a GWP > 5. In this instance the credit cannot be awarded by default as there are alternatives for designers to consider. These alternatives include revisiting the design and the room conditions specification to see if the cooling equipment is necessary. In addition, whilst a manufacturer or supplier may specify a narrow temperature band for server equipment, acceptable limits detailed in ASHRAE guidance[90] may allow a greater temperature range without adverse effect and thus the cooling equipment may not be necessary.
GWP data not available	Where GWP data for the specified refrigerant is not available, the credit cannot be awarded on a default basis.

Schedule of Evidence Required

Req.	Design Stage	Post Construction Stage
1&2	A copy of the specification clause confirming either: • Absence of refrigerant in the development OR • Type(s) of refrigerant to be used. **AND** Manufacturer's information confirming: • GWP of each refrigerant.	Assessor's building/site inspection and as built drawings confirming: • Presence or absence of any refrigeration plant. **OR** • A letter from the design team/developer confirming: - The refrigerant type specified remained unchanged. **OR** Where a change has occurred, written confirmation from the design team confirming: • Type of refrigerant(s) used. **AND** Manufacturer's information confirming: • GWP of each refrigerant.

Additional Information

Global Warming Potential: GWP 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 (or ITH) should be applied.

Ozone Depleting Potential: ODP is the ratio of the relative amount of degradation to the ozone layer caused by a particular substance relative to the calculated depletion for the reference gas CFC 11 (ODP = 1.0). The ODP of the refrigerants is not assessed under this issue and there is no link between GWP and ODP.

Refrigerant: there are three main make-ups of refrigerants:

- Hydrogenated Fluorocarbon Refrigerants (HFCs) are made up of hydrogen, fluorine, and carbon. Because they do not use a chlorine atom (which is used in most refrigerants) they are known to be one of the least damaging to our ozone.
- Hydrogenated Chlorofluorocarbon Refrigerants (HCFCs) are made up of hydrogen, chlorine, fluorine, and carbon. These refrigerants contain minimal amounts of chlorine; they are not as detrimental to the environment as some other refrigerants.
- Chlorofluorocarbon Refrigerants (CFCs) contain chlorine, fluorine and carbon. These refrigerants carry high amounts of chlorine so they are known for being the most hazardous to the ozone layer.

Table of refrigerants and their Global Warming Potentials: the table below includes available substances which are capable of acting as refrigerants. Many are not currently used as such and some have been phased out and withdrawn from the market.

Table 23 Refrigerant GWP

Refrigerant type	GWP	Refrigerant type	GWP
R11 (CFC-11) *	4000	R32 (HCFC-32) *	580
R12 (CFC-12) *	8500	R407C (HFC-407)	1600
R113 (CFC-113) *	5000	R152a (HFC-152a)	140
R114 (CFC-114) *	9300	R404A (HFC blend)	3800
R115 (CFC-115)*	9300	R410A (HFC blend)	1900
R125 (HFC-125)	3200	R413A (HFC blend)	1770
Halon-1211	N/A	R417A (HFC blend)	1950
Halon-1301	5600	R500 (CFC/HFC) *	6300
Halon-2402	N/A	R502 (HCFC/CFC) *	5600
Ammonia	0	R507 (HFC azeotrope)	3800
R22 (HCFC-22) *	1700	R290 (HC290 propane)	3
R123 (HCFC-123) *	93	R600 (HC600 butane)	3
R134a(HFC-134a)	1300	R600a (HC600a isobutane)	3
R124 (HCFC-124) *	480	R290/R170(HC290/HC170)	3
R141b (HCFC-141b) *	630	R1270 (HC1270 propene)	3
R142b (HCFC-142b) *	2000	R143a (HFC-143a)	4400

N/A Indicates that there is insufficient data available to give a GWP value.

- Global warming potential (GWP) values are based on best available data at the time of writing and are based on a 100-year time horizon. Other published data may be based on different time horizons.

- All CFC/HCFC refrigerants (marked *) have an ODP > 0 and as such are illegal for new installations. Existing equipment may continue to use them at present. The use of CFCs and HCFCs as refrigerants has been addressed under the Montreal protocols. Phase out programmes have been agreed resulting in these substances no longer being used as refrigerants in all new build and most existing situations. The industry's favoured replacements are currently HFCs which are often potent global warming contributors.

- Whilst it is currently still legal to have an existing system that uses refrigerants with an ozone depleting potential, it is now illegal to top up with CFCs (either new or recycled refrigerant). It will be illegal to top up with new HCFCs from 2010, and it will be illegal to top up with recycled/recovered HCFCs from 2015.

- Hydrocarbons and ammonia-based refrigerants have low or zero GWP and are therefore preferred long-term options. These are now widely available and are valid alternatives to HFCs in all buildings, provided health and safety issues are fully addressed.

Issue ID	Issue Title	No. of credits available	Minimum standards
Pol 2	Preventing Refrigerant Leaks	1	No

Aim

To reduce the emissions of refrigerants to the atmosphere arising from leakages in cooling plant.

Assessment Criteria

The following demonstrates compliance:

Refrigerant leak detection

1. The building has no refrigerants **OR**

2. Systems using refrigerants are contained in a moderately air tight enclosure (or a mechanically ventilated plant room), and a refrigerant leak detection system is installed covering high-risk parts of the plant. **OR**

3. An automatic permanent refrigerant leak detection system is specified, which is NOT based on the principle of detecting or measuring the concentration of refrigerant in air.

Refrigerant recovery system

4. The automatic shutdown and pump down of refrigerant occurs on the detection of high concentrations of refrigerant in the plant room/enclosure. For the majority of cases only systems in mechanically ventilated/moderately air tight plant rooms (or enclosures) comply.

5. Automatic pump-down to either a separate storage tank or into the heat exchanger is acceptable but only where automatic isolation valves are fitted to contain the refrigerant once fully pumped down.

6. The alarm threshold that triggers automatic pump down is set to a maximum of 2000ppm (0.2%), but lower levels can be set. The credit cannot be awarded for manual systems.

Compliance Notes	
New Build	There are no additional or different criteria to those outlined above specific to new build projects.
Refurbishment	There are no additional or different criteria to those outlined above specific to refurbishment projects.
Extensions to existing buildings	Where an existing building is being extended and it has existing building services plant and systems that will be common to both the new extension and existing building, the existing plant must be assessed against the criteria of this issue. If the extension is served by independent services, only these need be assessed against the Assessment Criteria.
Fit Out Only	The criteria apply to any existing cooling plant and new plant specified as part of the fit out.

Type of refrigerant	This issue is applied in instances where any type of refrigerant is present, i.e. even if the ozone depleting potential (ODP) of the refrigerant is zero and the global warming potential (GWP) is less than 5.
Solid refrigerant	The credit(s) can be awarded by default where a solid refrigerant is used.
CO_2 as a refrigerant	Where CO_2 is used as a refrigerant, the refrigerant recovery system credit/requirements can be awarded/met without the need for a recovery system, provided that the design team confirm the system/installation requirements of BS EN 378:2008[91] and the Institute of Refrigeration Carbon Dioxide as a Refrigeration Code of Practice[92] is complied with.
Ammonia as a refrigerant	Where Ammonia is used as a refrigerant, the refrigerant recovery system credit/requirements can be awarded/met without the need for a recovery system, provided that the design team confirm the system/installation requirements of BS EN 378:2008[91] and the Institute of Refrigeration Ammonia Refrigeration Systems Code of Practice[93] is complied with.
Total refrigerant charge less than 5 kg	The credit(s) can be awarded by default where the total refrigerant charge used in the building is less than 5kg.
Multiple split systems	For installations of small multiple hermetic systems only, where the refrigerant charge in each unit is less than 5kg but the total refrigerant charge in the building is greater than 5kg, the credit(s) can be awarded by default. This is on the basis that the risk of a large refrigerant leak is minimised and individual leaks from each system will be small i.e. <5kg.
High-risk parts	High-risk parts of refrigeration plant typically include the pipe work and compressor. Evaporator or condenser coils can be omitted from the coverage of the system.
Manual refrigerant recovery system	The provision of any manual system, including manual storage cylinders on site, does not comply with the criteria of this issue.
Cold food storage – higher education buildings	The criteria of this issue apply to cold food storage refrigeration equipment (where the charge is ≥ 5kg), i.e. cold rooms and/or centralised equipment serving a group of cold storage cabinets. Cabinets and refrigerated bottle shelves with integral refrigeration plant on average have a charge of 0.3kg; therefore in most circumstances, individual or small-scale multiple installations will not fall within the scope of this issue. However, the assessor should ask the design team to confirm that the charge is ≤ 5kg.

Schedule of Evidence Required

Req.	Design Stage	Post Construction Stage
1	A copy of the specification clause or design plan confirming: • Absence of refrigerants in the development.	Assessor's building/site inspection and photographic evidence confirming: • Absence of refrigeration plant.
2&3	A copy of the specification clause or letter from the M&E engineer confirming: • Type of leak detection system(s). • Scope of the system(s) • Where relevant, containment strategy for such equipment.	Assessor's building/site inspection and photographic evidence confirming: • Installation of leak detection system(s) • Installation of automatic refrigerant recovery equipment • Pre-set threshold level for automatic

4,5&6	A copy of the specification clause or letter from the M&E engineer confirming: • Type, scope and operation of automatic refrigerant recovery equipment • Details of the plant room enclosure where the refrigeration plant is installed • Alarm threshold for triggering automatic pump down.	pump down.

Additional Information

Relevant definitions

Moderately airtight enclosure: this can be defined as an enclosure that does not produce a draught or significant fresh air ingress that would dilute any leaked refrigerant gas (dilution may prevent detection).

Refrigerant Leak Detection: a permanently installed multi-point sensing system; this may be aspirated or have multiple sensor heads linked to a central alarm unit or BMS. Various sensor types are available including infra-red, semi-conductor or electro-chemical. Please see below for further guidance on the coverage of refrigerant leak detection systems.

Refrigerant Recovery: The process of removing refrigerant from a system and storing it in an airtight container.

Leak detection systems/devices

- Handheld detectors (which include semi-conductor and corona discharge types) do not comply with BREEAM criteria.
- Corona discharge detectors are not suitable where flammable refrigerants are used, or in potentially explosive atmospheres.
- Indicator dyes: these consist of fluorescent or coloured dyes added to the refrigerant to show leakage sites. The use of the dye should be approved by the compressor manufacturer. Some compressor manufacturers do not approve the use of indicator dyes, in which case either an alternative type of equipment should be used, or an alternative type of leak detection specified.
- Halide torch detectors: this type of detection is only appropriate for chlorine-based substances such as CFCs and HCFCs, and should not be used in areas where naked flames are prohibited. Compounds which do not contain chlorine, e.g. HFCs, cannot be detected by this method. When awarding this credit in instances where these detectors are in use, the assessor should confirm that the refrigerant is chlorine based.
- Electronic leak detectors: these must be designed to detect a certain type of, or multiple types of, refrigerant, i.e. CFC, HFC, HCFC, etc.
- Standing hold test: systems based on monitoring pressure drops within the pipe work are not necessarily compliant with the BREEAM criteria. There are natural fluctuations to the pressure of the refrigerant due to changes in volume and temperature of the system, and to the ambient temperature of the surroundings. Low pressure and high pressure switches, which are standard equipment on refrigerant plant, are therefore not sufficient to award the credit. Other methods exist, such as pressurising the system with a high pressure, dry nitrogen gas for a period of time and then identify whether or not the pressure drops during this time. However, this requires systems to be shut down for a period of time (usually overnight or longer).
- Systems NOT based on the principle of detecting or measuring the concentration of refrigerant in air: Such systems (for example based on sensing the presence of refrigerant vapour in liquid-carrying pipes) are now commercially available.

Refrigerant pump down

The specification of automatic refrigerant pump down can further limit potential losses and damage to the environment and have subsequent economic benefits to the building owner. Under the United Kingdom 1990 Environmental Protection Act unwanted refrigerant and refrigerating system oil are

classified as either controlled or hazardous waste. Not only is it an offence to discharge them to the environment, but there are procedures regarding transport, storage, transfer of ownership and ultimate disposal. Article 16 of EC regulation 2037/2000 specifies that used CFCs and HCFCs must be recovered for destruction or recycling/reclamation.

Issue ID	Issue Title	No. of credits available	Minimum standards
Pol 3	Refrigerant GWP – Cold Storage	1	No

Aim

To reduce the contribution to climate change from refrigerants with a high global warming potential.

Assessment Criteria

The following demonstrates compliance:

1. All refrigerant types used in cold storage systems have a global warming potential (GWP) of less than 5.

2. The requirement applies to refrigerants used in systems integral to the building, including where specified:

    a. Cold storage enclosures.
    b. Cold store services including: Chilled water pipework, refrigerant pipework and ductwork etc
    c. Fixed cold or chilled storage cabinets
    d. Fixed cold drink coolers.

Compliance Notes	
New Build	There are no additional or different criteria to those outlined above specific to new build projects.
Refurbishment	There are no additional or different criteria to those outlined above specific to refurbishment projects.
Extensions to existing buildings	There are no additional or different criteria to those outlined above specific to the assessment of extensions to existing buildings.
Fit Out Only	The criteria apply to new and replaced storage systems specified as part of a fit out and the refrigerants used in any existing systems that will remain post fit out. Any existing system that use refrigerants with an ozone depleting potential or a global warming potential of more than 5 must have been converted to use a refrigerant with a zero ODP and GWP less than 5. Where this is not possible, such systems will need to be replaced to meet the assessment criteria.
Domestic-scale refrigeration equipment & small plug-in chillers	The scope of this BREEAM issue excludes domestic-scale refrigeration equipment and small 'plug-in' chillers and therefore plant not integral to the building.
GWP data not available	Where GWP data is not available, the credit cannot be awarded by default.
No cold food storage	For developments where the tenant or end use function is known and cold food storage is not required, then this issue does not need to be assessed.

Schedule of Evidence Required

Req.	Design Stage	Post Construction Stage
1&2	A marked-up design plan highlighting the cold food storage areas/plant in the building. A copy of the specification clause confirming either: • Type(s) of refrigerant to be used. **AND** Manufacturer's information confirming: • GWP of each refrigerant.	A letter from the design team/developer confirming: • The refrigerant type specified remained unchanged. **OR** Where a change occurred, written confirmation from the design team confirming: • Type of refrigerant(s) used. **AND** Manufacturer's information confirming: • GWP of each refrigerant.

Additional Information

Relevant definitions

Please refer to BREEAM issue Pol 1.

Issue ID	Issue Title	No. of credits available	Minimum standards
Pol 4	NO_x emissions from heating source	3	No

Aim

To encourage the supply of heat from a system that minimises NO_x emissions, and therefore reduces pollution of the local environment.

Assessment Criteria

The following demonstrates compliance:

1. Where manufacturer's details demonstrate that the plant installed to meet the building's space heating demand has dry NO_x emission levels as follows:

    a. **One credit** where the dry NO_x emissions from delivered space heating energy are ≤100 mg/kWh (at 0% excess O_2).
    b. **Two credits** where the dry NO_x emissions from delivered space heating energy are ≤70 mg/kWh (at 0% excess O_2).
    c. **Three credits** where the dry NO_x emissions from delivered **space heating** energy are ≤40 mg/kWh (at 0% excess O_2). And emissions from delivered **water heating** energy are 100 mg/kWh or less (at 0% excess O_2).

    The emissions should be estimated under normal operating conditions (not standby).

Compliance Notes	
New Build	There are no additional or different criteria to those outlined above specific to new build projects.
Refurbishment	If the heating demand for the refurbished building is being met by an existing system, then the NO_x emission level for the existing system must be assessed against the criteria of this issue.
Extensions to existing buildings	The rule above for refurbishment projects also applies to new build extensions to existing buildings.
Fit Out Only	The criteria apply to any existing or new heating plant specified as part of the fit out. For fit outs of tenant units/floors where heating is provided and managed centrally by a third party, i.e. landlord; the central system must be assessed against the criteria for this issue. If the NO_x emission level for this system cannot be confirmed the credits must be withheld.
Highly insulated building	Where the heating load for a highly insulated/exemplar environmental building is less than or equal to 7% of the heat load for a Building Regulations-compliant building of the same size and type, 1 credit can be awarded regardless of the primary fuel used. Figures used for calculations of the percentage of total heat demand must be based on the output from an *approved energy modelling software*.

NO_x data provided in different units	Where data is provided in different units, or at a level of excess oxygen greater than zero, the manufacturer/supplier should be asked to convert this to comply with the BREEAM criteria. Alternatively, the assessor may correct these using the correction factors provided in the Additional Information section.
Grid electricity	Where some of the building's space heating is fuelled by electricity from the National Grid, however small the incidence is on the overall consumption, the credits will not be achievable as power stations emit NO_x at an average rate of approximately 1200 mg/kWh. This figure is a UK average and therefore also applies to areas/countries with a higher proportion of renewable sources, such as Scotland.
Electricity from a renewable source	Where electricity used by the heating system is sourced from a zero emission renewable source such as PVs, wind etc, there are no resulting emissions. This source of heating can therefore be counted as having zero NO_x emissions.
Heat pumps	Heat pumps powered by grid electricity are likely to indirectly produce emission rates higher than those required by BREEAM and are therefore typically unable to achieve any credits under issue Pol 4. However, there is a formula for determining NO_x emissions from heat pumps in the Additional Information section below. Please note, the energy saved by using certain types of heat pumps is recognised in BREEAM issue Ene 1 and the reduced emissions are recognised under BREEAM issue Ene 5.
District heating	District heating systems that incinerate waste usually have NO_x emission rates higher than the levels set to achieve any BREEAM credits.
Heat recovery	Heat recovery can be considered as having zero NO_x emissions for the purpose of this issue.
Combined Heat & Power	Refer to the additional guidance section for guidance on calculating NO_x emission levels from CHP.
Biomass	Whilst Biomass systems are recognised as low carbon systems, they can produce a significant amount of NO_X and so may not achieve this credit; however they can score highly in the Energy section of BREEAM. Biomass systems are also recognised as reducing the impact of fossil fuel depletion by employing a renewable combustion fuel source.
More than one heating system	Refer to the additional guidance section for guidance on calculating NO_x emission levels where heat is provided by more than one system.
Green Tariff	Commitments to use a Green tariff to supply electricity to heat the building or power heat pumps are not recognised in this issue due to the uncertainty that this electricity will be zero emission.

Schedule of Evidence Required

Req.	Design Stage	Post Construction Stage
1	A copy of the specification clause confirming: • Type of heating system(s) installed. For each system specified, a letter, email or literature from the manufacturer(s) confirming: • Dry NOx emissions rate in mg/kWh. If more than one system is providing heat, design team calculations confirming: • The average NOx emission rate.	Assessor's building/site inspection and photographic evidence confirming: • Heating system(s) installed. **OR** A letter from the design team or main contractor confirming: • No changes to the specification.

Additional Information

Relevant definitions

Approved energy modelling software: Refer to BREEAM issue Ene 1 for a definition.

NO_x emissions: are pollutant gases produced by the combustion of fossil fuels. NO_x reacts with heat and sunlight to produce ozone that can cause serious respiratory problems. It also reacts with water to produce acid rain which has a detrimental effect on ecosystems.

Dry NO_x Levels: the NOx emissions (mg/kWh) resulting from the combustion of a fuel at 0% excess oxygen levels.

Calculating NO_x emission levels from Combined Heat & Power (CHP) systems
Where CHP systems are present or specified, only the heat-related emissions are considered for the assessment of this issue. The NO_x emissions are allocated to heat and electricity in line with the respective power outputs. This is done using a NO_x emission rate for the electrical output equivalent to the current rate for grid electricity, and allocating the remaining NO_x to the heat output. Only the heat-related component is then compared with the credit scale. The following formula should be used to determine this:

$X = (A - B) / C$

Where:

$X = NO_x$ emissions per unit of heat supplied (mg/kWh heat)
$A = NO_x$ emissions per unit of electricity generated (mg/kWh^{elec}) i.e. the NO_x emitted by the CHP system per unit of electricity generated. This figure should be obtained from the installer/supplier of the system.
$B = NO_x$ emissions per unit of electricity supplied from the grid (mg/kWh^{elec}) this should be assumed to be 1200mg/kWh
C = Heat to Electricity Ratio of the CHP scheme.

The above methodology determines the net NO_x emissions from CHP-generated electricity compared with central generation of electricity and allocates this amount to the heat production. Where X is calculated to be negative, it should be assumed to be zero.

Where heat is provided by more than one system, an average NO_x emission rate should be used based on the ratio of power outputs from each source, i.e. multiply the emissions of each boiler by the percentage of heat demand it supplies and total these values. This is likely to be the case where a CHP

system has been sized on the base power demand rather than the heat demand and therefore a secondary heating system is required. The following formula can be used:

Average NO_x Emission Rate = $(N_1 \times (H_1/H_T)) + (N_2 \times (H_2/H_T)) \ldots\ldots + (N_n \times (H_n/H_T))$

Where:

N_1 = NO_x emissions rate for source 1
N_2 = NO_x emissions rate for source 2
N_n = NO_x emissions rate for source n
H_T = Total heat output from all sources
H_1 = Heat output from source 1
H_2 = Heat output from source 2
H_n = Heat output from source n

Calculating NO_x emission levels from heat pumps
For the purpose of assessing this BREEAM issue, either of the formulas below can be used to determine the contributing NO_x emissions from a heat pump:

$$M_{Heat} = \frac{M_{Elec} \times W_{Elec}}{W_{Heat}} \quad \textbf{OR} \quad M_{Heat} = \frac{M_{Elec}}{EER}$$

Where:

M_{Heat} = NO_x emission per unit of heat generated in mg/kWh_{Heat}
M_{Elec} = NO_x emissions from UK grid electricity mg/kWh, this should be assumed to be $1200mg/kWh^{elec}$
W_{Elect} = Total quantity of electricity consumed by heat pump kWh_{Elec}
W_{Heat} = Total quantity of heat produced by heat pump kWh_{Heat}
EER = Energy Efficiency Ratio (also referred to as Co-efficient of Performance)

Conversion factors
Manufacturers should be asked to supply dry NO_x emissions data in mg/kWh. Where this is not possible the assessor may use the following conversion factors to convert figures in ppm, mg/MJ, mg/m^3 or wet NO_x. It should be noted that these conversion factors assume worst case efficiencies and are likely to give conservative answers. This could have the effect of lowering the number of credits achieved.

- Figures in mg/m^3 should be multiplied by 0.857 in order to gain emissions in mg/kWh. A conversion may also be necessary for data not calculated at 0% excess oxygen (see below).

- Figures in parts per million (ppm) should be multiplied by 1.76 in order to obtain mg/kWh. A conversion may also be necessary for data not calculated at 0% excess oxygen. (see below)

- Figures in mg/MJ should be multiplied by 3.6 in order to show emissions in mg/kWh (1 kWh = 3.6 MJ). A conversion may also be necessary for data not calculated at 0% excess oxygen (below).

- This Issue's criteria are based on *dry NOx* values – almost all manufacturers will quote emissions in *dry NOx*. However if wet NOX figures are supplied, these should be converted to *dry NOx*. This can be done by multiplying the wet NOX figure by 1.75.

Excess Oxygen Correction: If a NO_x emission rate is quoted by the manufacturer in mg/m^3 or ppm, then it should be established at what % excess oxygen this emission was measured. The greater the amount of excess oxygen in the flue gases at the time of measurement, the more "diluted" the NO_x. It is therefore important to convert any emission rate back to 0% excess oxygen. For the purpose of BREEAM, the following conversion factors can be used for the most frequently used rates supplied by manufacturers:

% Excess O_2	Conversion (c)
3 %	x 1.17
6%	x 1.40
15%	x 3.54

Conversion factor c = 20.9/(20.9 – x)

Where x = % excess O_2 (NOT excess air) and 20.9 is the percentage of O_2 in the air.

Issue ID	Issue Title	No. of credits available	Minimum standards
Pol 5	Flood Risk	3	No

Aim

To encourage development in low flood risk areas or to take measures to reduce the impact of flooding on buildings in areas with a medium or high risk of flooding.

Assessment Criteria

The following demonstrates compliance:

Two credits

1. Where the assessed development is situated in a flood zone that is defined as having a low annual probability of flooding.

2. A site specific Flood Risk Assessment (FRA) confirms that there is a low risk of flooding from all sources.

Or one credit

1. Where the assessed development is situated in a flood zone that is defined as having a medium or high annual probability of flooding **AND**

2. A site specific Flood Risk Assessment (FRA) confirms to the satisfaction of the local authority and statutory body that the development is appropriately flood resilient and resistant from all sources of flooding **AND**

3. The ground level of the building, and access to it and the site, are designed (or zoned) so they are at least 600mm above the design flood level of the flood zone in which the assessed development is located (see compliance notes for further guidance).

One additional credit

1. Where attenuation measures are specified to ensure that the peak rate of run-off from the site to the watercourses (natural or municipal) is no greater for the developed site than it was for the pre-development site. This should comply with the *Interim Code of Practice for Sustainable Drainage*[94] systems published by CIRIA, or for at least a 1 year and 100 year return period event with a 6 hour duration.

2. The capacity of the attenuation measures must include an allowance for climate change; this should be made in accordance with current best practice[95].

Compliance Notes	
New Build	There are no additional or different criteria to those outlined above specific to new build projects.

Refurbishment	Refurbishment projects, where no new building or hard landscaping areas are developed, are likely to achieve the credit for attenuation of surface water run-off. In such instances, as a minimum, a Flood Risk Assessment must have been carried out and any identified opportunities to reduce surface water run-off as a result of the refurbishment works must be implemented.
Extensions to existing buildings	There are no additional or different criteria to those outlined above specific to the assessment of extensions to existing buildings.
Fit Out Only	This issue is not assessed in Fit Out-only assessments.
Definition of flood zones	Please refer to the Additional Information section.
Sources of flooding	If the development is in Zone 1, the FRA must demonstrate that there is low risk of flooding from the following sources: • Fluvial (rivers) • Tidal • Surface water: sheet run-off from adjacent land (urban or rural) • Groundwater: most common in low-lying areas underlain by permeable rock (aquifers) • Sewers: combined, foul or surface water sewers.
Functional flood plain	The BREEAM credit for locating in a flood zone of 'medium or high annual probability' cannot be awarded where the building is located in the functional flood plain. PPS25[96] defines the functional flood plain as a 'zone [that] comprises land where water has to flow or be stored in times of flood'. If the building assessed is or has been defined as 'water-compatible development', please refer to the BREEAM office for guidance on assessing this BREEAM issue.
Environment Agency flood maps	The Environment Agency flood map and associated information is intended for guidance, and cannot provide details for individual properties. In addition the EA map only covers the likelihood of flooding from the rivers or sea and not all sources of flooding (listed above). EA flood maps cannot therefore be used as evidence to demonstrate compliance with the assessment criteria.
Pre-existing flood defences	In an area protected by existing flood defences (designed to withstand a certain magnitude of flooding) the appropriate number of credits can be awarded where the defences reduce the risk to 'low' or 'medium' **and** the following conditions are met: 1. The development **is not located** in an area where new flood defences have to be, or have been, constructed to minimise the risk of flooding to the site and its locality purely for the purpose of the development and/or its wider master plan 2. The development **is located** on a previously developed land (as defined by the criteria in BREEAM issue LE1 Re-use of land) and the appropriate statutory body confirm that, as a result of the existing defences, the risk of a flood event occurring is reduced to low or medium (as appropriate to the credit levels set in BREEAM). If firm confirmation is not provided then the credit cannot be awarded 3. The relevant agency confirms that, as a result of such defences, the risk of a flood event occurring is reduced to low or medium risk. A statutory body's local/regional office may be able to provide more information on existing defences in the area in which the assessed development is located.

600mm threshold	It is accepted that, for buildings located in a medium flood zone, areas of the car park and site access may be allowed to flood and therefore fall below the 600mm threshold. In such cases the credit is still achievable provided safe access to the site and the ground floor of the building can be maintained (i.e. they are 600mm above the design flood level) to ensure the building/site does not become an 'island' in the event of a flood. Where the development has been permitted and the ground levels of the topography/infrastructure immediately adjacent to the site fall below the 600mm threshold, the credit can still be awarded, provided there are no other practical solutions for access to the site above this level and the assessed building, and access to it, meets the assessment criteria. As much of the external site area as possible (or as required by an appropriate statutory body) should be designed at or above the threshold. In further & higher education buildings located in medium or high flood risk zones, any areas used to store sensitive, historical, hazardous, valuable and perishable materials, e.g. radioactive materials, microbiological facilities, server rooms, libraries, etc., must be above the 600mm threshold.
Third-party defences	There are many defences, owned by third parties, which due to their location act as a flood defence by default e.g. motorway, railway embankments, walls etc. It can be assumed that embankments will remain in place for the lifetime of the development, unless the assessor or project team have reason to believe otherwise. For walls, assurance must be sought that the wall is likely to remain for the design life of the building.
Effectiveness of the water run-off attenuation measures	To ensure effective operation of the water run-off attenuation measures, the facilities must discharge half their volume within 24-48 hours (unless advised otherwise by a statutory body) of the storm event in readiness for any subsequent storm inflow.
Calculating peak rate of run-off	There are British Standards[97 & 98] that contain guidance on calculating the peak flow rate and determining the design flooding frequency. The assessor is not required to perform any calculation as this should be provided by the design team to demonstrate that they have sized the attenuation facilities to store the relevant volume of storm water necessary to achieve the credit.
Discharge to the sea or estuaries	If all run-off is discharged directly from the site to either the sea, the foreshore, estuaries covered by a shoreline management plan or designated wildlife/SSSI areas (as part of habitat management) then the credit can be awarded without the need to specify additional attenuation measures.
More stringent criteria	Where the local authority (or other statutory body) requires a greater attenuation than the percentages above, and/or a more onerous design flooding frequency than that recommended in BS EN752-4, then the higher criteria must be met in order to achieve the credit.
Recommendati-ons from an appropriate statutory body	None of the credits can be awarded where the assessed development has proceeded against the recommendation of the statutory body on the basis that the flooding implications are too great.

Schedule of Evidence Required

Req.	Design Stage	Post Construction Stage
First & Second Credit		
1	A copy of a flood map or flood risk assessment confirming: • Flood zone or annual probability of flooding in the site location. Where appropriate, correspondence from the appropriate statutory body confirming: • Reduced annual probability of flooding due to existing flood defences.	As design stage, no further evidence is needed.
2	A copy of the Flood Risk Assessment.	Formal written correspondence from the design team confirming: • The FRA has not changed or required updating in the intervening period.
3	Site plans/sections confirming: • The design flood level for the site • The design ground level(s) for all developed areas of the site. • Safe access and escape routes	'As built' site plans/sections.
Additional SUDS Credit		
1&2	Site plans and a copy of the specification or consultants report confirming: • Type and storage volume (l) of the water run-off attenuation measures • Total area of hard surfaces (m^2) • Peak flow rate (l/s) for the design storm event • Additional allowance for climate change designed in to the system.	Assessor's building/site inspection and photographic evidence confirming: • Installation of water run-off attenuation measures • No changes to the evidence provided at the interim 'design' assessment stage. A letter from the design team or main contractor confirming: • No changes to the specification. Where changes have occurred, copies of as-built designs and calculations must be provided.

Additional Information

Relevant definitions

Appropriate Consultant: a consultant with qualifications and experience relevant to the calculation of surface water run-off and design SUDS and flood prevention measures. Where complex flooding calculations and prevention measures are required, this must be a specialist hydrological engineer.

Appropriate statutory body: this refers to either the Environment Agency in England and Wales, the Rivers Agency in Northern Ireland, the Scottish Environment Protection Agency in Scotland or the local authorities and internal drainage boards.

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

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

Design flood event: an historic or notional flood event of a given annual flood probability, against which the suitability of a proposed development is assessed and mitigation measures, if any, are designed.

Design storm event: historic or notional weather conditions of a given annual probability, against which the suitability of a proposed development is assessed and mitigation measures, if any, are designed.

Flood event: A flooding incident characterised by its peak level or flow, or by its level or flow hydrograph.

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

Flood risk: the combination of the flood probability and the magnitude of the potential consequences of the flood event.

Flood risk assessment: a study to assess the risk of a site flooding, and to assess the impact that any changes or development on the site will have on *flood risk* on the site and elsewhere. A Flood Risk Assessment should be prepared according to good practice guidance as outlined in Development and Flood Risk: A practice guide companion to PPS 25, available from www.communities.gov.uk.

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

Flood zone: see table below for definition of flood zones.

Greenfield: a site which has either never been built on, or one which has remained undisturbed for five years or more.

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

Hard surfaces: these include roofs, car parks, access roads, pavements, delivery/service yards and external hard landscaping. Footpaths less than 1.5m wide which have free drainage to soft landscaped areas on both sides may be excluded.

ICoP (SUDS): the Interim Code of Practice for Sustainable Drainage Systems (SUDS) aims to facilitate the implementation of sustainable drainage in developments in England and Wales by providing model maintenance agreements and advice on their use. It provides a set of agreements between those public organisations with statutory or regulatory responsibilities relating to SUDS. Available to download from www.ciria.org.uk/suds/icop.htm

Infiltration: the passage of water into a permeable surface, such as soil, permeable paving, soakaways and so on.

Natural watercourses: any natural channel that conveys surface water.

Peak run-off rate (referred to as Q_p [m^3/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.

Pre-development: the state of the site under assessment immediately prior to purchase of the site by the client/developer (or, where the client has owned/occupied the site for a number of years, its current state).

Run-off: this is usually rainwater, but can also be groundwater or overspill from sewers and other sources.

Run-off rate: the rate of discharge of water from a surface.

Run-off attenuation measures: this covers the range of construction and equipment which can be employed to attenuate run-off from hard surfaces and roofs. Measures include: underground storage, oversized pipes, holding ponds, swales, reed beds, permeable paving, green roofs, local or centralised soakaways etc.

Peak flow rate: the peak rate of discharge of water from hard surfaces. For the purpose of calculating the peak flow rate volume, a 60 min duration of the design storm event should be used (unless a different duration is required by a statutory body).

Sewerage undertaker: this is a water company with statutory responsibility for sewerage and sewerage disposal and also surface water from roofs and yards of premises.

Shoreline Management Plan: SMPs provide a large-scale assessment of the risks associated with coastal processes and present a policy framework to reduce these risks to people and the developed, historic and natural environment in a sustainable manner.

SUDS - sustainable drainage systems or sustainable (urban) drainage systems: a sequence of management practices and control structures designed to drain surface water in a more sustainable fashion than some conventional techniques. SUDS devices include:

- Holding ponds
- Swales
- Reed beds
- Permeable paving - in areas where local geological and hydrological conditions allow this to function, e.g. block paved surface on permeable sub-base over gravel bed to store the water and allow it to seep into the soil. For less permeable soils, the gravel layer might be deeper and the water taken to a soakaway although this is not an option in some areas.
- Local or centralised soakaways either as full systems or as ‘overflow’ or ‘holding’ systems, in areas where local geological and hydrological conditions allow them to function.
- Run-off from roofs collected as a part of a rainwater harvesting system.
- Run-off from roofs directed to a local soakaway or other holding facility such as tanks, ponds, swales etc.
- Green roofs.

Surface Water Run-off: water flow over the ground surface to a drainage system. This occurs if the ground is impermeable, is saturated or if the rainfall is particularly intense.

Flood zones

Flood zones are defined in the relevant planning, policy and technical guidance documents for each country in the UK: PPS25 (England), TAN15 (Wales), SPP7 (Scotland), PPS15 (N. Ireland). Please note, PPS15 does not categorise flood risk zones and there are no similar publicly available flood maps covering Northern Ireland. Assessments in NI will therefore need to rely on site-specific flood risk assessments, or other relevant date/surveys, to determine the extent of flood risk for a specific development, and use the same definitions as those outlined for England (table below). The Northern Ireland Department of Environment or Rivers Agency may offer further advice or recommendations in this respect www.doeni.gov.uk/ and www.riversagencyni.gov.uk/

Whilst the definitions of flood zones and probabilities of flooding are generally the same throughout the UK, there are some differences. The definitions are outlined in the table below.

Table 24 Definition of flood zones by country

Definition	England	Wales	Scotland
Low annual probability of flooding	**Zone 1** Less than 1 in 1000 chance of river and sea flooding (<0.1%)	**Zone A** Considered to be at little or no risk **Zone B** If site levels are greater than the flood levels used to define adjacent extreme flood outline.	**Little or no risk area** As defined for England
Medium annual probability of flooding	**Zone 2** Between 1 in 100 and 1 in 1000 chance of river flooding (1% – 0.1%) and between a 1 in 200 and 1 in 1000 chance of sea flooding (0.5% – 0.1%).	**Zone B** If site levels are not greater than the flood levels used to define adjacent extreme flood outline. **Zone C** Equal to or greater* than 0.1% (river, tidal or coastal flooding). * For the purposes of BREEAM assume upper probability of flooding no greater than that specified for England.	**Low to medium risk area** Watercourse, tidal or coastal flooding in the range 0.1% – 0.5% (1:1000 – 1:200).
High annual probability of flooding	**Zone 3a High Probability** 1 in 100 or greater chance of river flooding(>1%) and a 1 in 200 or greater chance of flooding from the sea (>0.5%). **Zone 3b The Functional Floodplain** Land where water has to flow or be stored in times of flood.	**Zone C1 & C2** * For the purposes of BREEAM assume the same lower and upper probability of flooding as that specified for England.	**Medium to high risk areas** Annual probability of watercourse, tidal or coastal flooding: greater than 0.5% (1:200)

Flood defences

Flood defences do not completely remove the risk of flooding, but they do reduce it. Building in areas where flood defences are present (and appropriately designed to withstand a certain magnitude of flooding) is therefore preferable to those built in medium/high risk areas without defences. However, for the purpose of this issue, it is still preferable to build in areas of low risk than encourage development of new flood defences in areas with a higher risk of flooding purely for the sake of new development.

Issue ID	Issue Title	No. of credits available	Minimum standards
Pol 6	Minimising Watercourse Pollution	1	No

Aim

To reduce the potential for silt, heavy metals, chemicals or oil pollution to natural watercourses from surface water run-off from buildings and hard surfaces.

Assessment Criteria

The following demonstrates compliance:

1. Specification of Sustainable Drainage Systems (SUDs) or source control systems such as permeable surfaces or infiltration trenches where run-off drains are in areas with a relatively low risk source of watercourse pollution.

2. Specification of oil/petrol separators (or equivalent system) in surface water drainage systems, where there is a high risk of contamination or spillage of substances such as petrol and oil (see Compliance Notes for a list of areas).

3. All water pollution prevention systems have been designed and detailed in accordance with the recommendations of Pollution Prevention Guideline 3[99] and where applicable the SUDS manual[100].

4. A comprehensive and up-to-date drainage plan of the site will be made available for the building/site occupiers.

Compliance Notes	
New Build	There are no additional or different criteria to those outlined above specific to new build projects.
Refurbishment	There are no additional or different criteria to those outlined above specific to refurbishment projects.
Extensions to existing buildings	Please refer to the compliance note below regarding '*infill building on an existing site'*.
Fit Out Only	The criteria apply to any existing or new facilities that fall within the scope of the fit out works.
Areas that are a source of pollution	For the purpose of assessing this issue an area that presents a risk of watercourse pollution includes vehicle manoeuvring areas, car parks, waste disposal facilities, delivery and storage facilities or plant areas.

Areas where oil separators are required	The following site areas (where present) require oil separators in surface water drainage systems: • Car parks larger than 800m^2 or with 50 or more parking spaces • Smaller car parks discharging to a sensitive environment • Areas where goods vehicles are parked or manoeuvred • Vehicle maintenance areas • Roads • Industrial sites where oil is stored or used • Refuelling facilities
SUDS and oil interception	In some instances, where the risk of contamination is infrequent and potential spills will be small, oil interceptors may not be required if appropriately designed Sustainable Urban Drainage systems are specified. Refer to PPG3 for additional guidance.
Infill building on existing site	Where the assessment is of an individual building on an existing site, i.e. infill development, the criteria apply to areas within the construction zone that present a risk of pollution, as well as any areas external to the construction zone that are affected by the new works i.e. drainage onto or from the proposed development.
Suitable level of treatment	In all cases the assessor should determine the operational use of the site in order to determine if the proposed surface water run-off strategy is suitable.
Rainwater run-off	This issue is not intended to cover the treatment of rainwater run-off except where there is a risk of significant pollution arising.
Underground/ covered areas	Where it can be demonstrated that there will be no drainage or wash down facilities that may lead water from inside the underground or covered area to natural watercourses, then such areas comply with the assessment criteria by default.
Roof plant	Roof top plant space must be considered where there is a risk from substances such as petrol or oil. Refrigerants are not assessed under this issue, as the only risk of pollution is to air and not the watercourse.
No areas at risk from pollution	Where it can be demonstrated that there are no external areas that present a pollution risk, e.g. parking, delivery, manoeuvring or servicing facilities (including individual parking spaces), external waste storage space or other hard standing areas AND there is no plant supported on the roof, then this credit can be awarded by default.
Permeable paving system	Where it can be demonstrated that a permeable paving system designed to retain silts and degrade oils has been used, then this will meet the assessment criteria of this issue for car parks and access roads.
Drainage plan	A comprehensive and up-to-date drainage plan of the site, which accurately identifies all drains, must be produced and handed over to the new occupier. If there is no in-house expertise to do this, a reputable drainage company should be used.

Schedule of Evidence Required

Req.	Design Stage	Post Construction Stage
1&2	Marked-up proposed site plan highlighting: • Low and high risk areas of the site. A copy of the specification or design plan confirming: • Type of pollution control systems specified.	Assessor's building/site inspection and photographic evidence confirming: • Installation of pollution control system(s).
3&4	A letter from the design team confirming: • All water pollution prevention systems designed in accordance with PPG3 and the SUDS manual (where appropriate) • Outlining indicative examples of compliance with PPG3 and the SUDS manual • A copy of the drainage plan will be produced and handed over to the building occupier.	A letter from the design team or main contractor confirming: • Installation of systems in accordance with compliant design. • No changes to the evidence provided at the interim 'design' stage assessment. Assessor's building/site inspection and photographic evidence confirming: • Existence of the drainage plan in the building's O&M manual/file.

Additional Information

Relevant definitions

Appropriate statutory body: This refers to either the Environment Agency in England & Wales, the Environment and Heritage Service (EHS) in Northern Ireland or the Scottish Environment Protection Agency in Scotland.

Low risk areas: Low risk areas can be defined as areas where the risk of contamination or spillage of substances such as petrol and oil is reduced. For the purpose of this credit, roofs and small car parks may be considered as low risk areas.

Soakaways: A sub-surface structure designed to promote the infiltration of surface water in to the ground. As a general point, soakaways may be shallow and broad – as in a blanket under permeable paving, or deeper structures. Deeper, point source soakaways should be avoided for road and car-park drainage, but shallow structures providing infiltration in an extensive way (infiltration trenches and permeable paving) do not need oil separators. See Pollution Prevention Guideline (PPG) 3 "*Use and design of oil separators in surface water drainage systems*", Environment Agency/SEPA/Environment & Heritage Service, 2006 for further guidance.

Types of Oil Separator

- **Class 1 Separators:** These are designed to achieve a concentration of less than 5mg/l oil under standard test conditions. They should be used when the separator is required to remove very small oil droplets, such as those arising from car park run-off.

- **Class 2 Separators:** These are designed to achieve a concentration of less than 100mg/l oil under standard test conditions. They are suitable for dealing with discharges where a lower quality requirement applies and/or for trapping large spillages.

  Both classes can be produced as 'full retention' or 'by pass' separators:

- **Full retention separators** treat the flow that can be delivered by the drainage system, which is normally equivalent to the flow generated by a rainfall intensity of 50mm/hr.

- **Bypass separators** fully treat all flows generated by rainfall rates of up to 5mm/hr. Flows above this rate are allowed to bypass the separator. These separators are used when it is an acceptable risk not to provide full treatment for high flows.

Pollution Prevention Guideline 3 contains more detailed guidance on the selection and sizing of an appropriate type of separator.

Issue ID	Issue Title	No. of credits available	Minimum standards
Pol 7	Reduction of Night Time Light Pollution	1	No

Aim

To ensure that external lighting is concentrated in the appropriate areas and that upward lighting is minimised, reducing unnecessary light pollution, energy consumption and nuisance to neighbouring properties.

Assessment Criteria

The following demonstrates compliance:

1. The external lighting strategy has been designed in compliance with Table 1 (and its accompanying notes) of the ILE Guidance notes for the reduction of obtrusive light, 2005[101], (see Additional Information below - Buildings located in Scotland must also refer to the Compliance Notes below for additional criteria).

2. All external lighting (except for safety and security lighting) can be automatically switched off between 2300hrs and 0700hrs. This can be achieved by providing a timer for all external lighting set to the appropriate hours.

3. If safety or security lighting is provided and will be used between 2300hrs and 0700hrs, this part of the lighting system complies with the lower levels of lighting recommended during these hours in Table 1 of the ILE's Guidance notes, for example by using an automatic switch to reduce the lighting levels at 2300 or earlier.

4. Illuminated advertisements, where specified, must be designed in compliance with ILE Technical Report 5 – *The Brightness of Illuminated Advertisements*[102].

Compliance Notes	
New Build	There are no additional or different criteria to those outlined above specific to new build projects.
Refurbishment	For refurbishment projects, in addition to any new external lighting specified, any existing lighting that will remain post development must be assessed against the criteria of this issue.
Extensions to existing buildings	If the scope of the assessment covers the new extension only, then it is only new lighting specified as part of that extended works that must be assessed against the criteria for this issue. If the new and existing building is being assessed as one, then the rule for refurbishments (above) applies to the existing building.
Fit Out Only	There are no additional or different criteria to those outlined above specific to fit out-only assessments.
Entire new development	Where the assessment is of an entire new development, the criteria apply site-wide.

Individual building on existing site	Where the assessment is of an individual building on an existing site then only those areas affected by the works i.e. within the construction zone, must be assessed.
No external lighting	If there is no external lighting on or around the assessed development the credit can be awarded by default.
Buildings located in Scotland	In addition to the criteria above, buildings located in Scotland must comply with the light pollution criteria in the guidance note '*Controlling Light Pollution and Reducing Lighting Energy Consumption*'[103]. This can be demonstrated via completion of the checklists in Annexes B and C of this document by a relevant member of the design team.
Safety lights	Flush stud lights used for safety purposes in vehicle manoeuvring areas may be excluded from the assessment.
Floodlighting, signage lighting	The guidance notes recommend the setting of a curfew, during which all non-essential external lighting is switched off. This will normally include floodlighting, signage and all lighting that is not required for safety or security.
Essential lighting between 2300 and 0700	Where essential lighting is provided between 2300 and 0700, i.e. for 24-hour operating buildings, the system is able to automatically switch to the lower levels of lighting recommended in the ILE Guidance notes for lighting during these hours (or provide these lower levels at all times).
Specific security criteria	Any light fittings in the areas outlined above that are specified to comply with specific security criteria/standards, and where those criteria and the BREEAM assessment criteria are not complementary, can be excluded from the assessment of this issue. In these circumstances the assessor must obtain evidence confirming that such criteria are applicable to the assessed development.

Schedule of Evidence Required

Req.	Design Stage	Post Construction Stage
1-4	A marked-up copy of the site plan showing: • Areas of the building and site that will be externally lit • Any nearby properties. A copy of the specification clause requiring, or external lighting design confirming: • The external lighting design in compliance with Table 1 of the ILE Guidance notes • Controls for all external lighting. • Illuminated advertisements designed in compliance with ILE Technical Report 5 (if relevant). In the case of the external lighting design, the M&E engineer or lighting designer must provided indicative examples of where and how the strategy complies with the assessment criteria.	Assessor's building/site inspection and photographic evidence confirming: • Cut-off luminaires, if provided, have been angled to limit spill light to potentially obtrusive directions. • External lighting controls A letter from the design team or main contractor confirming: • Installation of systems in accordance with compliant design. • No changes to the evidence provided at the interim 'design' stage assessment.

Additional Information

Relevant definitions

Construction zone: For the purpose of this credit the construction zone is defined as the site which is being developed for the BREEAM assessed building and its external site areas i.e. the scope of the new works.

The ILE Guidance notes for the Reduction of Obtrusive Light, 2005 are available free of charge from the ILE website www.ile.org.uk.

Table 1 of ILE guidance
Table 1 of the ILE guidance and its accompanying notes outlines four sets of recommendations:

1. Limits to the average upward light ratio of the luminaires, to restrict sky glow.
2. Limiting illuminance at the windows of nearby properties for which light trespass might be an issue.
3. Limiting the intensity of each light source in potentially obtrusive directions beyond the site boundaries.
4. Limiting the average luminance of the building, if it is floodlit.

In each case the limiting values depend on the location of the site of the building (for example rural, urban or city centre). A calculation of illuminance (b) or intensity (c) is not required if all luminaires are cut-off types and angled so that light in potentially obtrusive directions is blocked.

Issue ID	Issue Title	No. of credits available	Minimum standards
Pol 8	Noise Attenuation	1	No

Aim

To reduce the likelihood of noise from the new development affecting nearby noise-sensitive buildings.

Assessment Criteria

The following demonstrates compliance:

1. There are, or will be, existing *noise-sensitive areas or buildings* within 800m radius of the assessed development.

   Where there are or will be no *noise-sensitive areas or buildings* in the locality of the assessed development, the credit can be awarded by default.

2. A noise impact assessment in compliance with BS 4142:1997[104] has been carried out and the following noise levels measured/determined:

   a. Existing background noise levels at the nearest or most exposed noise-sensitive development to the proposed development; or at a location where background conditions can be argued to be similar.
   b. The rating noise level resulting from the proposed noise-source. This can be based upon reference to similar installations or sites, or determined by calculation.

   The noise impact assessment must be carried out by a *suitably qualified acoustic consultant* holding a recognised acoustic qualification and membership of an appropriate professional body (see relevant definitions in the additional guidance section).

3. Where the rating level of the noise source(s) from the site/building is equivalent to or less than the background noise level, the credit can be awarded.

4. Where the rating level of the noise source(s) from the site/building is greater than the background noise level, measures have been installed to attenuate the noise at its source to a level where it will comply with requirement 3.

Compliance Notes	
New Build	There are no additional or different criteria to those outlined above specific to new build projects.
Refurbishment	There are no additional or different criteria to those outlined above specific to refurbishment projects.
Extensions to existing buildings	There are no additional or different criteria to those outlined above specific to the assessment of extensions to existing buildings.

Fit Out Only	The criteria for fit out assessment are the same as those outlined above, subject to the following: 1. If the fit out includes the replacement of building servicing plant or changes to site layout/access that are likely to result in the creation of a specific noise that will raise the ambient noise level, then an assessment must be carried out. 2. The credit can be awarded where it can be demonstrated that the creation of a specific noise is unlikely to raise the ambient noise above the existing background level. This may be the case where the BREEAM-assessed unit forms part of a larger development and as a result, specific attenuation measures specified for the building/unit would have little or no effect on the overall ambient noise level. 3. If the fit out results in no new specific noise source then the credit can be awarded.
Part of a larger mixed-use development	If the development forms part of a larger mixed-use development, where noise sensitive buildings exist or will be developed, then the noise assessment must be carried out to ensure noise from the assessed building will not create a future problem.
Assessed building is defined as *noise sensitive*	If the assessed building is itself defined as a *noise sensitive building* then a noise impact assessment must be carried out regardless of the assessed buildings locality to other *noise sensitive areas or buildings*.
Scope of the noise impact assessment	For the purposes of BREEAM the noise impact assessment relates only to building services plant; additional process-related noise does not have to be considered. Stand-by generating plant should also not be included.
Standard not appropriate / not applicable	Where a suitably qualified acoustician confirms that BS4142:1997 is not an appropriate standard of assessment for the proposed building/site, their assessment of the likelihood of complaint from noise impact can be accepted for the purpose of assessing this issue.

Schedule of Evidence Required

Req.	Design Stage	Post Construction Stage
1	Site plan highlighting: • All existing and proposed noise-sensitive buildings local to, and within, the site boundary • Proposed sources of noise from the new development • Distance (m) from these buildings to the assessed development.	Assessor's building/site inspection report and photographic evidence confirming: • All noise-sensitive buildings local to, and within, the site boundary • Proposed noise sources within the development • Distances (m) from these buildings to the assessed development.
2&3	A copy of the acoustician's report. The acoustician's qualifications and professional status. **OR** A copy of the specification clause requiring: • A noise assessment in compliance with BS 4142:1997 by a suitably qualified acoustician. **OR** A formal letter from the client or design team	A copy of the acoustician's report with measurements based on installed and operating plant.

	confirming that they will appoint an acoustician to carry out a noise assessment in compliance with BS 4142:1997	
4	Acoustician's report with recommendations for noise attenuation measures. **AND** A marked-up design plan highlighting the specification of the acoustician's attenuation measures **OR** A formal letter from the client or design team confirming that: • If relevant, attenuation measures recommended by an appointed suitably qualified acoustician will be installed.	Assessor's building/site inspection report and photographic evidence confirming: • The existence of the specified noise attenuation measures. **OR** A formal letter from the acoustician confirming that all specified attenuation measures have been installed to the required standard.

Additional Information

Relevant definitions

Suitably qualified acoustician: an individual who holds a recognised acoustic qualification and membership of an appropriate professional body. The primary professional body for acoustics in the UK is the Institute of Acoustics. Acousticians that meet the definition of a suitably qualified acoustician in Hea 13, will also meet the definition for the purposes of compliance with this issue.

Noise sensitive area: landscapes or buildings where the occupiers are likely to be sensitive to noise created by the new plant installed in the assessed building, including:

- Residential areas
- Hospitals, health centres, care homes, doctor's surgeries etc.
- Schools, colleges and other teaching establishments.
- Libraries
- Places of worship
- Wildlife areas, historic landscapes, parks and gardens.
- Located in an area of Outstanding natural beauty or near a Site of Special Scientific Interest (SSSI).
- Any other development that can be considered noise sensitive.

13.0 Innovation

Issue ID	Issue Title	No. of credits available	Minimum standards
Inn 1	Innovation	10	No

Aim

To provide additional recognition for a procurement strategy, design feature, management process or technological development that innovates in the field of sustainability, above and beyond the level that is currently recognised and rewarded within standard BREEAM issues.

Assessment Criteria

The following demonstrates compliance:

A maximum of 10 credits are available in aggregate from any combination of the following:

Up to 10 credits are available by meeting Exemplary Performance for existing BREEAM issues

1. Exemplary performance is demonstrated by meeting Exemplary Performance criteria for existing BREEAM Issues. Please refer to the table below for a list of BREEAM issues with defined exemplary performance criteria (this is also found in section 3.0 of the manual, *Scoring and Weighting*). For the specific Assessment Criteria please refer to the section of the technical guidance containing the relevant BREEAM issue.

Table 25 BREEAM issues with exemplary level criteria

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

Up to two credits are available for the Comprehensive use of a *BREEAM Accredited Professional (AP)* throughout project work stages

First credit

1. BREEAM performance objectives are agreed, (and must be achieved at final certification – see Compliance Notes below) no later than the end of the design brief stage (e.g. RIBA Stage B or equivalent procurement stage).

2. The appointed *BREEAM Accredited Professional* is given the opportunity to attend key design team meetings (see Compliance Notes below) held from the start of RIBA Stage B (Design Brief) up to and including Stage E (Technical Design) or equivalent, and is to be included on the circulation list for minutes from all meetings.

3. A Design stage assessment report is submitted to BRE Global for interim certification.

Second credit

4. The first credit is achieved.

5. The project is reviewed against BREEAM performance objectives by the appointed *BREEAM Accredited Professional* no later than the end of the Pre-Construction stage (e.g. RIBA Stage H (Tender Action) or equivalent procurement stage).

6. The appointed *BREEAM Accredited Professional* is given the opportunity to attend key design team meetings held from the start of RIBA Stage F (Production Information) up to and including Stage K (Construction to Practical Completion) or equivalent, and is to be included on the circulation list for minutes from all meetings.

7. A Post Construction stage assessment report is submitted to BRE Global for final certification.

Additional credits are available for *Approved Innovations* not currently recognised by an existing BREEAM issue

1. An application is made to, and approved by the BREEAM office using the Innovation Application Form (downloaded from the Assessor Extranet).

2. The Assessor confirms compliance with the criteria set out within the Innovation Application Form.

Compliance Notes	
New Build	There are no additional or different criteria to those outlined above specific to new-build projects.
Refurbishment	There are no additional or different criteria to those outlined above specific to refurbishment projects.
Extensions to existing buildings	There are no additional or different criteria to those outlined above specific to the assessment of extensions to existing buildings.
Shell Only	There are no additional or different criteria to those outlined above specific to shell only projects.
Fit Out only	There are no additional or different criteria to those outlined above specific to fit-out only projects.
Credit limit for Innovation section	A maximum of ten credits may be sought in the Innovation section (e.g 3 credits for Exemplary performance / 2 credits for the use of a *BREEAM Accredited Professional* / 5 credits for the use of an *Approved Innovation*)
Key design team meetings	Key design team meetings can be classed as all site and office meetings between representatives from at least three of the following parties:

	• Representatives of the Client / Developer • The Main Contractor • The Architect • Structural Engineers • Building Services Engineers • Cost Consultants • Environmental Consultants • Project Management Consultants Team meetings must be related to the building under assessment.
BREEAM performance objectives	If, at Post Construction, the BREEAM performance objectives (the target rating) set at the end of the Concept Stage have not been achieved, the credits awarded, at the interim 'design' certification stage, for appointing the *BREEAM Accredited Professional* must be withheld in the final certification report.

Schedule of Evidence Required

Req.	Design Stage	Post Construction Stage
Exemplary Performance against existing BREEAM criteria		
1	As defined within existing BREEAM Issues	As defined within existing BREEAM Issues
Use of a *BREEAM Accredited Professional*		
1, 2, 4 & 6	A copy of a letter confirming the appointment of a *BREEAM AP* no later than completion of RIBA Stage B (Design Brief) or equivalent. This must confirm that the *BREEAM AP* will be invited to all key design team meetings. **AND** A completed Pre-Assessment Estimator/Report signed and dated by the *BREEAM AP* to correspond with no later than RIBA Stage B **AND** A copy of the project programme indicating the dates by which the key work stages (Preparation and Design) are to be completed. **AND** Documentary evidence in the form of meeting notes/minutes, recorded correspondence or schedules that can demonstrate BREEAM issues are a regular agenda item.	As Design stage, but with documentary evidence confirming that the *BREEAM AP* was given the opportunity to attend all key design team meetings between the dates corresponding to the start of RIBA Stage F and finish of Stage K, or equivalent.
5	An updated interim report (this does not need to be formally submitted to BRE Global but must be used as evidence).	As Design stage.

3 & 7	The Interim Design stage assessment report. In the case of req. 7, a commitment from the client to complete (to final certification) the BREEAM Assessment process. This can take the form of confirmation from the assessor that they have been appointed by the client to complete the BREEAM assessment to final certification.	The Post Construction stage assessment report.
Use of an *Approved Innovation* not covered by existing BREEAM criteria		
1 & 2	A copy of the relevant Innovation Application Form and BRE Global report confirming approval of the innovation. **AND** Relevant evidence demonstrating compliance with the criteria defined in the approved Innovation Application Form.	As Design stage **AND** Documentation confirming that the project has achieved the *Approved Innovation* as described and quantified within the approved Innovation Application Form.

Additional Information

Relevant definitions

BREEAM Accredited Professional: An individual qualified and accredited by BRE as a specialist in built environment sustainability, environmental design and assessment. The role of the BREEAM AP is to facilitate the project team's efforts to successfully schedule activities, set priorities and negotiate the trade-offs required to achieve a target BREEAM rating when the design is formally assessed. For a list and contact details of BREEAM Accredited Professionals visit www.greenbooklive.com

Approved Innovation: Any technology, method or process that can be shown to improve the sustainability performance of a building's design, construction, operation, maintenance or demolition, and which is approved as innovative by BRE Global. See Innovation Application Form (available from the Assessor Extranet) or scoring and weighting section (section 3) of this technical guide.

Procedure for reviewing applications for BREEAM Innovations and awarding BREEAM credits for approved Innovations

Applications for approval of Innovations can only be made by Licensed BREEAM Assessors with reference to a specific registered assessment. Applications will only be accepted when submitted on the formal Innovation Application Form (downloaded from the Assessor Extranet).

A flat rate charge will be levied to cover the costs of administering and reviewing the application. Details of this charge are set out in the BREEAM Certification and Licence Fee Sheet and are non refundable. A separate application will be required for each proposed innovation credit.

The process for approving Innovations is as follows:

1. On receipt of an application form, the BREEAM office will carry out an administrative review to ensure completeness. An acknowledgement will be sent by email giving a credit application reference number which should be used in all correspondence. This acknowledgement will be sent within 3 working days.

2. The application will be forwarded for peer review by one or more experts from the BRE Group of companies and where/if appropriate individual(s) from a relevant external organisation. All expert reviewers will be asked to declare any interest that they may have in the project

concerned and no confidential information concerning the applicant or application will be communicated to an external organisation.

3. The expert will independently review the submission against the criteria outlined in the Eligibility criteria in the S*coring and Weightings* section. The review will result in a recommendation for or against approval, together with a justification for that decision. The expert will review the application based on the descriptions and commitments made in the Innovation Application Form and their knowledge/expertise of the subject matter.

4. The BREEAM office will prepare a report setting out a clear recommendation based on the expert review.

5. BREEAM's Technical Director will review the report and make a final decision on whether to approve or not approve the Innovation.

6. The final decision will typically be communicated to the Assessor by email within 20 working days from receipt of the initial application.

7. Finally, to achieve the credit for the approved Innovation the design team must demonstrate to the BREEAM Assessor that the building meets the criteria defined in the application form. If the design/project team are unable to provide the BREEAM Assessor with auditable evidence of compliance, then the additional credit for the approved Innovation must be withheld.

Appeals against any decision can be made in accordance with BRE Global's published appeals procedures which are available on request. The decision made on any appeal is final. Appeals will be subject to a flat rate charge per application; in the instance of a successful appeal, the appeal fee will be refunded.

At final certification of the project, BRE Global will publish basic information on all approved Innovations included within the Post Construction stage assessment. This will be done in a way that is sensitive to applicant's intellectual property and commercial rights, who will be given a chance to comment on, and if necessary amend, entries before they are made public. *BREEAM Assessors and Accredited Professionals* will have access to a list of previously approved or not approved Innovations published on the Assessor Extranet. This list will be updated regularly.

Innovations are considered to be so until information on the *Approved Innovation* is published. In the instance of similar Innovation being submitted concurrently by independent projects BREEAM Assessors and clients can expect BRE Global to make a reasonable assessment of whether the later submission can still be held as Innovative as described in credit criterion. BRE Global will not review, or charge a BREEAM Assessor for an identical application that has previously been applied for and not approved.

14.0 Technical Checklists

14.1 Technical Checklist A1: Man 2 Considerate Constructors

For each of the eight sections (below) the *Considerate Constructors Scheme* awards a score on a scale of 0 to 5 (with half points). The score achieved or required must be entered into boxes 1-8 below i.e. EITHER 0; 0.5; 1; 1.5; 2.0; 2.5; 3.0; 3.5; 4.0; 4.5; OR 5.0.

- When a firm commitment is made to achieve certification under the Considerate Constructors Scheme without reference to particular scores, a score of 3 should be entered in each of the boxes 1-8 below. This gives a total score of 24 in box 9 below and subsequently one credit can be awarded.
    - When a firm commitment is made to require the constructor to achieve certification AND a score greater than 3 is required in one or more sections, the scores required should be added in boxes 1 to 8 below and totalled accordingly.

Considerate Section	Score achieved		1
Environmentally Aware Section	Score achieved		2
Site Cleanliness Section	Score achieved		3
Good Neighbour Section	Score achieved		4
Respectful Section	Score achieved		5
Safe Section	Score achieved		6
Responsible Section	Score achieved		7
Accountable Section	Score achieved		8
TOTAL Considerate Constructors Score	(sum of 1-8)		**9**

Total CC score achieved is less than 24	0 credits
Total CC score is between 24 to 31.5 incl.	1 credit
Total CC score is between 32 and 35.5 incl.	2 credits
Total CC score is greater than ≥36	2 + Innovation credit

Assessor to award credits based on committed CCS Score and above table 10

Signed: ..... Date: .....

Name [PRINT]: ..... Organisation: .....

14.2 Technical Checklist A2: Man 2 Considerate Constructors

Compliance with an alternative to the Considerate Constructors Scheme

- 1 credit can be awarded where the assessment stakeholder confirms in writing that the alternative scheme is to be independently assessed and the assessor confirms that the alternative scheme addresses all the mandatory items plus 50% of the optional items in Checklist A2 (complete box 1).
- 2 credits can be awarded where the assessment stakeholder confirms in writing that the alternative scheme is to be independently assessed and the assessor confirms that the alternative scheme addresses all the mandatory items plus 80% of the optional items in Checklist A2 (complete box 2).
- An additional innovation credit can be awarded where post construction, the site has complied in full with the alternative, independently assessed scheme, and the alternative scheme addresses all the mandatory and optional items in Checklist A2 (complete box 3).

POST CONSTRUCTION REVIEW
When certification can be demonstrated the actual items achieved in each section should be quoted.

Where the mandatory criteria + 50% of optional criteria are complied with/committed to

Score achieved: 1 credit

☐ 1

OR

Where the mandatory criteria + 80% of optional criteria are complied with/committed to

Score achieved: 2 credits

☐ 2

OR

Where post-construction ALL the mandatory and optional items are complied with.

Score achieved: Innovation credit (in addition to the two credits achieved for complying with the standard BREEAM assessment criteria).

☐ 3

The assessor must ensure that the commitment is specific to the BREEAM assessment criteria and not a general commitment to satisfy the above statements.

Total Credits for Alternative Independently Assessed Scheme ☐

1) Considerate

Mandatory

Ref	Compliance	Guidance	P
a	Where introductory letters have been sent / are to be sent to all the neighbours.	See copies of letters to be sent or sent with a list of the addresses	
b	Where there is provision for parking on site OR Buses are provided from local transport nodes OR The nearest transport links are within 500m and run every 30 minutes OR An area offsite has been designated for site parking.	See copies of parking plan, check local vicinity for transport links.	
c	Where there are ramps and signs, indicating footpaths AND Where pathways are wide enough for wheelchair access AND Where pedestrians who are mobility impaired or who have sight/hearing difficulties can still gain access around the site boundary.	View on site.	
d	Where there are barriers and signposts indicating footpaths around the site. Where footpaths are clean Where the passageways are safe and protected.	View on site.	
e	Where all the road signs / names can be seen OR Where a road sign /name is obstructed a replacement has been erected.	Is there a temporary works plan highlighting these items. View on site.	

Optional

Ref	Compliance	Guidance	P
e	Does the site have a traffic plan?	Request a copy of the plan.	
f	Where site entrances / exits clearly marked AND These are clear for lorry/delivery drivers and other visitors to see.	View on site.	
g	Where there is a clearly signed site reception AND. Where appropriate, visitors are inducted into the site AND Where visitors are escorted to the member of staff they are visiting.	Check on arrival for the signs. See copy of the induction procedure.	
h	Where there are areas of high minority communities and English is not the first language, notices are printed in the common local language.	Check the area, local shops and members of the public, community centres for a minority culture community. Where this is present check for signs in the communities language.	
i	Where the site is near a school, community centre / or other building and delivery times are outside peak times.	School peak times considered to be 8-9.30am and 3-5pm Residential peak times 7-9am and 4-6pm. Other shops / industries may have regular deliveries, this should also be considered by the Contractor.	
j	Where the site manager is authorised to reimburse minor financial complaints.	Ask the site manager what authorisation he needs to reimburse financial complaints.	
k	Where the parish registry has been checked to establish the names of neighbours to personalise your letters.	List of names and addresses to be viewed on site.	
l	Where a map has been sent to suppliers indicating where they should access the site by a particular route.	Check a copy of the map sent to all suppliers with accompanying letter.	
m	Where the post box has been placed on the pavement to avoid the postman from entering the site.	View on site.	

2) Environmentally Aware

Mandatory

Ref	Compliance	Guidance	P
a	Where site hours and noisy work restrictions are appropriate to the area.	Consider particularly areas near; -Houses -Schools - Hospitals -Industrial Units -Public Transport Nodes -City centres -Shopping facilities Copy of statement of intent, policy, agreement etc to be provided.	
b	Where the Contractor has made provisions to reduce the noise.	Are reasonable sound restrictions in force e.g. whispering generators, straw bales, sound barriers etc Has the Contractor demonstrated that noise/plant have been considered and measures implemented to reduce the disturbance?	
c	Where there is a written commitment from the Contractor to protect any sensitive ecological features such as plants and trees. AND This is demonstrated onsite. NOTE: Plants cannot be removed and replanted as part of this work.	Written commitment to be provided, along with a copy of "before and after" drawings. The commitment should include how the features will be protected and how the protection measures were determined. Temporary works procedures to include the appropriate protective measures. View on site.	
d	Where the site boundary is clearly and safely marked and appropriate to the environment. AND Where the colour of the hoarding has been considered in terms of the surrounding environment.	Ask site manager if any thought was given to the hoarding and the location of the site. Is the hoarding clearly /safely marked, clean, neat and well maintained?	
e	Where protected wild life issues in the local area have been addressed by the company.	Speak to the site manager about the local wildlife issues and how the site are addressing them and how they are monitored See evidence of drawings or specification clauses that back up the claims.	
f	Where the site has an environmental policy AND The site manager can relate the environmental policy to the procedures on his site AND The site staff are aware of the environmental policy and how it relates to their work	Request a copy of the policy. Ask the site manager what the policy includes and how this relates to the site. Ask members of staff at different levels how the policy relates to work at their level.	
g	Where there is a procedure and adequate equipment for protecting watercourses from site pollution (i.e. oils, paints and chemicals).	Bunds, absorbent material to soak up any spillages, must be present at risk areas on site. If there is a site specific environmental policy which commits to preventing water pollution and describes how this is to be on the site this point can be awarded.	
h	Where fuel oil spillage equipment is available.	View on site. Ensure the spillage equipment is located where spillages may occur to ensure a rapid response time.	
i	Have local suppliers and materials, and also recycled materials been considered?	If a list of recycled/local suppliers and materials has been produced the point can be awarded..	
j	Where there are restrictions on the effects of light pollution and all lights are directional and non-polluting	View on site. If there is a site specific environmental policy which sets restrictions on lighting, this point can be awarded.	
k	Where the site is segregating, recycling or re-using waste (including canteen and office waste).	This can be viewed on site. A company wide policy promising to segregate, recycle and re-use waste will NOT satisfy this credit. If there is a site specific environmental policy which commits to segregating, recycling and re-using waste then the inspector can award this point.	
l	Where the site has a system to monitor the amount of material waste produced, and provides feedback as to how much is recycled.	This can either be viewed on site. If there is a site specific environmental policy which commits to monitoring site waste and providing feedback on recycling, indicating how this is to be carried out, then this point can be awarded.	

Ref	Compliance	Guidance	P
m	Where energy saving measures implemented on site.	Examples of this include: • low energy lighting • switching off equipment when not in use, • Installing thermostats • Installing timers, • choosing energy efficient equipment	
n	Are the carbon emissions from the site activities monitored?	Where a site specific environmental policy monitors the carbon emissions of site activities the point can be awarded.	
o	Where areas with dust problems are enclosed, or alternative methods of mitigating dust have been provided.	Check how dust mitigation has been considered with the Site Manager; check that this will be effective.	
p	Where sumps are provided in cases of heavy water run off.	View on site. If there is a site specific environmental policy which indicates how heavy water run off will be minimised and dealt with on site, this point can be awarded.	
q	Where a site with severe congestion has a delivery point remote from a site. Deliveries from the remote site can then be made in smaller vehicles at times to cause the least inconvenience.	View procedures on site. Where a site specific environmental policy addresses the problem of deliveries to a severely congested site, then the point can be awarded.	
r	Where permission has been obtained to use a fire hydrant or fire brigade to damp down.	Written permission to be provided.	
s	Where an impact minimisation strategy review is in place for the site.	The review should consider the impact of the site in environmental terms and how any adverse effects are being minimised.	
t	Where there is adequate space for new materials to be stored in secured covered areas to avoid damage, theft and to protect from weather.	View on site. Ensure that where space has been provided, it is being used correctly.	
u	Where visible stacked materials are sheeted out.	View on site.	

3) Clean

Mandatory

Ref	Compliance	Guidance	P
a	Where all accesses to the site are clean, mud free and safe.	View on site. Where a site specific policy indicates measure that will be implemented to maintain clean, mud free, safe accesses, then this point can be awarded.	
b	Where the roads adjacent to the site that are used by site vehicles are swept.	Evidence in the form of a contract with a road sweeping company. View on site.	
c	Where there is an area specified within the site boundary for the storage of materials and plant.	The area must be clean and dry where necessary, and the space should be sufficient for the materials / plant stored. For the material storage part, this could be replaced on congested sites by a "just in time" delivery policy View on site.	
d	Where there are dust prevention measures present.	Where there is a regular damping down of the roads during the hot weather AND Where dust sheets are provided where areas are being demolished. OR Where any other measures can be demonstrated to meet this point.	
e	Where materials and equipment are tidily stacked and protected / covered where necessary.	View on site.	
f	Where areas around the canteen, offices and skips are tidy and clean AND	View on site. Check all the areas ensure screening is in place where	

Ref	Compliance	Guidance	P
	Areas are screened where necessary.	necessary.	
g	Where covered rubbish bins are available.	View on site. The inspector should ensure that where bins are provided they are spaced at intervals which will facilitate staff using them	
h	Where a free car cleaning service is offered, where dirt or dust is a problem.	View on site. Check procedures, notice boards, with staff to see if this is in operation.	
i	Where the wind direction is checked and the work pattern is varied to suit, if dust is a problem.	View whether dust is a problem on site, this should be checked in the driest season. If dust is a problem then ask the site manager how work is varied depending on the wind direction.	
j	Where a hard road is provided into the site to reduce mud problems.	View on site.	
k	Where site welfare facilities well maintained and clean?	View on site.	
l	Where areas around the site cleaned, including the collection of rubbish not related to site?	View on site.	
m	Where measures in place to deal with graffiti?	View on site.	

4) Good Neighbour

Mandatory

Ref	Compliance	Guidance	P
a	Where there is a single line entry complaints book.	Copy of the book to be provided or seen AND the book should be kept in an easily accessible place.	
b	Are complaints responded to immediately and dealt with correctly.	Look through the complaints book and check the responses. Ensure all complaints were dealt with and responded to in a polite, considerate and timely manner.	
c	Where there is light shielded from the neighbours.	Copy of the temporary works including lighting to be provided. These must either indicate light shielding or the site manager must demonstrate how the light shielding works or is not applicable.	

Optional

Ref	Compliance	Guidance	P
d	Where there are viewing boards in the hoardings AND They give a good impression.	Ask the site manger to explain why the views in the hoardings were chosen and how they best represent the site. Check that the areas that can be seen are tidy and clean.	
e	Where an arrangement is in place for a neighbour to act as a representative for a group.	Request to see a letter of confirmation that one local will act as a representative of the community or group.	
f	Where reasonable steps have been taken to ensure a minimum of false alarms.	For example • 24 hour security. Speak to the security guard. Ensure that the security guard know how to deal with alarms procedures both real and false. Check that this information is transferred to new staff. • Alarms are linked to a central office open 24hours which responds immediately. • Other measures to minimise false alarms can be considered on their merits and how appropriate they are to site criteria.	
g	Where the site and its surroundings are seen by the public as tidy AND Where the site and its surroundings are seen by the public as clean.	Ensure that there are no complaints about the site being untidy or dirty or that if there were this was quickly rectified and not repeated. Check on site that the views in the hoardings show a clean and tidy site.	

h	Where there is a congested site, and there is a compound away from the site used for plant/ material storage.	Only applicable if the site is congested. Speak to the site manager about this extra storage and visit extra compound.	
i	Where local people are informed of site progress by the use of a notice board.	View on site.	
j	Where there are rewards for a neighbour's help.	View procedures or examples of what Is being done on site	
k	Where there is a model of the project to better show neighbours the exact implications of the project.	Where a model has been built and had been shown at local residents meetings OR Where there is a commitment to build a model for this purpose.	
l	Where there is a procedure for a member of staff to check the view in the viewing apertures at regular intervals.	Where there is a written procedure or commitment to regularly check the viewing apertures, or where the viewing apertures are to be changed at different stages of the project to ensure the best view is provided. During site visits, check the viewing apertures and ensure the view is safe, tidy, clean and inoffensive.	
m	Where there is a commitment to write and thank neighbours at the end of the contract for their forbearance.	A copy of this commitment should be provided or a copy of a standard letter that is always sent at the end of a project.	
n	Where, on completion of the project, the neighbours who have been affected by the work are given a feedback form, to indicate their concerns and mark the Contractors performance These results should then be used to improve your performance next time.	Where a copy of feedback form for neighbours can be provided. AND; Where there is a commitment to send these forms to affected neighbours. AND; Where there are procedures in place to monitor the results and implement changes for future work.	
o	Where extra sets of posters are prominently displayed illustrating how the site is being a good neighbour.	View on site.	
p	Where appropriate get involved with local community charities and initiatives.	Where there is evidence of such events having already occurred or where there are future arrangements or a commitment to do so.	
q	Where measures are in place to reduce negative displacement (e.g. pigeons).	View on site.	

5) Respectful

Mandatory

Ref	Compliance	Guidance	P
a	Where there is a dress code specified in the induction.	Check the induction content for items related to dress code. N.B. This does not relate to PPE, this is to prevent "builders bum" syndrome	
b	Where there is an enforcement procedure i.e. someone does check that operatives are dressed considerately,	Check the induction content for these details. Ask how operatives who are not dressed "appropriately" are dealt with? Is the procedure rigorous Check the complaints book for any items on this issue and see how quickly they were dealt with.	
c	Where inappropriate behaviour is dealt with in site policy. AND; Where this is highlighted in the site induction.	Copy of the policy to be provided. Check the induction content for these details. Ask the site manager what the enforcement procedures are and how they are carried out. Check the complaints book for any items on this issue and see how quickly they were dealt with.	
d	Where there is a no offensive calendar policy.	Check how this policy is implemented.	

Optional

Ref	Compliance	Guidance	P
d	Does the site have female toilets. Does the site have disabled toilets.	View on site.	
e	Where operatives are prevented from having their breaks in view of the public.	Examples of how this might be achieved include: • A site canteen • A common room available for operatives to eat in. View on site.	
f	Where toilets are screened from public view.	View on site	
g	Where lockers are provided in the drying room.	View on site	
h	Are working usable showers available and suitable changing areas are available.	View on site.	
i	Where site personnel are discouraged from using local facilities in their site clothes.	Examples of how this might be achieved include : A canteen. Staggered breaks for different gangs. Provision of showers / wash rooms. Provision of lockers. A request to leave PPE on site. View on site. Check procedures with the Site Manager.	
j	Where there is a volume restriction on radio use or there is a radio ban.	Check if restrictions/ban is in place and how it is enforced.	
k	Where operatives are provided with suitable clothing with the companies logo.	Check company policy to do this and check with operatives on site that they have clothing with the company's logo.	
l	Provide operatives with a clip on ID card with photo.	Check company policy and procedures for issuing clip on ID cards. Check if there is a mandatory requirement for operatives to wear these when on site. Check operatives in site are wearing them.	
m	Where the site encourages only 1 person to visit the local shop at any one time.	Examples of how this can be achieved include : • Where there are facilities on site to buy newspapers, confectionary and snacks • Where breaks are staggered to prevent large groups of operatives visiting local shops together. • One person is nominated to go to the local shop for the team.	
n	Is there sufficient action taken regarding operatives' exposure to the sun?	Check company policy and procedure and if it is being implemented on site.	

6) Safe

Mandatory

Ref	Compliance	Guidance	P
a	Where there are well lit warning signs for the benefit of the pedestrian and road user.	Check if the signs are indicated on the temporary works / other plans OR if they are being implemented on site.	
b	Where the temporary works are safe and are erected only after they have been checked by an experienced engineer.	See copy of the temporary works checking procedure, check the responsible engineer has the relevant qualifications. Check that the temporary works are checked by a visual or physical inspection on a regular basis. Carry out a site inspection.	
c	Are the temporary works near adjacent buildings likely to produce a security risk.	Ask if a risk assessment was carried out when designing the works and check if this was identified. View on site.	
d	Pedestrians have a suitable, safe and protected passage around the site boundary.	View on site.	

Optional

Ref	Compliance	Guidance	P
e	Is safe access to the site office provided by; good lighting AND Adequate barriers AND Uniform surfaces i.e. no trip hazards AND Being a minimum of 1m wide.	View on site.	
f	Where work has interrupted the pavement ensure ramps are provided.	View on site.	
g	Where the scaffolding is boxed in or taped where likely to obstruct pedestrians.	View on site.	
h	Where the hoarding or scaffold is properly lit externally at night?	View on site.	
i	Where scaffold netting is in place and well maintained.	View on site.	
j	Where emergency escape routes are well identified?	View on site.	
k	Are even the most minor accidents recorded.	Check first aid book for minor accidents. Minor considered to be e.g. small cuts (plaster only necessary), dust in eyes.	
l	Where others use the site and there is a regular fire drill.	Check times of drill and visit a day the drill should be carried out.	
m	Where there is a procedure to report serious incidents and near misses.	Copy of procedure to be provided. Procedure to cover internal QA reporting format, and notifying HSE.	
n	Where there is satisfactory out of hour's security.	Examples of satisfactory out of hours security include: • Locked gates. • Night lighting. • 24 hour on site security. • An alarm linked directly to a police station or 24 hour (local) off site security. • The security guard has an emergency number and knows who to call in an emergency.	
o	Where non English speaking operatives are tested during their induction, to ensure that their levels of reading, writing and speaking do not pose a safety risk to those that they work with.	This needs to be robust enough to ensure that in a health and safety risk environment, the operative would be capable of warning others or contacting help.	
p	Where temporary road crossings are in a suitable safe place.	Check: Road crossings away from corners. The design has been checked by a traffic expert. There is a risk assessment for these areas, are the remaining risks acceptable?	
q	Where the site office is well sign posted and easily accessible.	View on site.	
r	Where safety helmets are positioned close to the entrance to the site office.	View on site.	
s	Where the visitors book is to be filled in on all occasions.	View on site.	

Ref	Compliance	Guidance	P
y	Where safety and other criteria in connection with deliveries are given to suppliers.	Check this information is given to suppliers; AND Check that this is enforced at every delivery, not just a one off letter to the company at the beginning of the project.	
u	Where there is a procedure for recording operative concerns and near misses.	Check if this is in place and how it operates.	
v	Where all site hazards are advertised at the site entrance (s).	View on site. Check that the list of site hazards is complete.	
w	Where there is an initiative to provide incentives to promote and improve safety on site.	Check this document and how it is disseminated.	
x	There are clear fire points, an assembly station and fire drills take place.	View on site and ask for written proof of a fire drill procedure.	

7 Responsible

Mandatory

Ref	Compliance	Guidance	P
a	Where the Environmental Officer has been informed of your presence on site.	See a copy of the letter, informing the Environmental Officer of the project, including start and finish construction dates.	
b	Where there is well posted material indicating nearest Police Station and Hospital (with A&E facilities)	Are there posters indicating the nearest Police Office, Hospital with A&E facilities in key areas e.g. site reception, site canteen, main site office. Spot check managers, operatives, reception staff to check they know this information or at least where they would find it. Check Induction talk.	

Optional

Ref	Compliance	Guidance	P
c	Where a record of your immediate neighbours names and telephone numbers are known.	A copy of this list should be provided.	
d	Where all subcontractors first aiders are recorded in a formal document and a copy of this record provided.	Check for the formal document which has all sub-contractors first aiders registered.	
e	Where an in-house newsletter is distributed to the neighbours.	Where a copy of this letter can be provided and evidence that this has been distributed, e.g. accompanying letters, recorded minutes etc.	
f	Where a local person provides out of hours cover.	If there is 24 hour security this is automatically awarded. Where there is no 24 hour security, but someone is identified as living local to the site and can act quickly in the event of an emergency on site.	
g	Where the workforce hold CSCS (Construction Skills Certification Scheme) cards.	Where the company has procedures in place to ensure that the majority of their workers hold CSCS cards.	
h	Where your company is recognised as having either ISO 9001, 14001 or IIP status.	Evidence that this has been achieved must be provided.	
i	Where operatives skills and medical conditions are recorded.	Check records and /or procedures to demonstrate this.	
j	Where there are the appropriate number of first aiders and first aid equipment for the site.	The HSE produce guidance on the number of required first aiders for a site. A copy of the trained first aider list should be provided and their qualifications, ensure that the qualifications are all still valid (i.e. in the last 3 years). Check that each first aider have a box with basic equipment in. Check that each first aider has access to more equipment is necessary and that they know where this is.	
k	Where local schools have been contacted and asked to participate in visits, talks or competitions.	Evidence should be provided that this has or will be occurring e.g. copies of press cuttings, letters etc. If there are no schools within a 3km radius this is not applicable.	
l	Where the site has a static gate man, he is trained in first aid.	Check with the static gate man that he is trained, see his certificates and ensure they are current.	
m	Where up to date information on site performance	View on site.	

	is posted in public view.	Check this is up to date and ask how regularly this is changed.	
n	Where you have a web page link to demonstrate your commitment to being a considerate neighbour throughout the construction project.	The link must highlight what the scheme includes and it aim.	
o	Where procedures are in place to enable the employment of disabled operatives.	A copy of the procedure should be provided in order to award the point.	

8) Accountable

Mandatory

Ref	Compliance	Guidance	P
a	Where there are posters in a public space displaying your local scheme for considerate construction and the main bodies involved.	Posters must identify the client, consultant, architect, and contractor. Posters must be well distributed over the site, as well as in the public eye.	
b	The scheme is mentioned in the site induction.	Check documentation.	
c	There has been a safety inspection and report, and any points raised have been dealt with.	Check report and view on site.	

Optional

Ref	Compliance	Guidance	P
d	Where an inspection has been carried out by HSE.	Only applicable if HSE have carried out an inspection, Where there are recommendations, there is a commitment to implement them.	
e	Where the company sign board is prominently displayed with telephone number / Web Site / Email address.	View on site.	
f	Where the site personnel and sub-contractors are familiarised with the local / national scheme at induction or other.	Check if induction procedures cover this item and if not how operatives are aware that they are involved in the scheme.	
g	Where the Client is aware of the Scheme.	This can be demonstrated by a letter or endorsement etc.	
h	Where frames and Perspex covers for posters advertising this Scheme are provided.	View on site.	
i	Where a suggestion box is provided for the general public.	View on site. This must be in a place accessible to the general public AND well advertised.	
i	Where all site signage and posters are illuminated at night.	View on site.	
j	Where a 24 hour hotline is provided and this is displayed to the public.	View on site. Check how this is manned and how phone calls, queries, complaints are dealt with.	
k	Where your operatives/subcontractors are given points for infringement of your safety and considerate standards. Record these on a card held by the operative. X points and you're out.	Check if this system is operating. 'X' must be decided by the company, however the aim is to encourage operatives to work safely and considerately. This point can also be awarded where there is an incentive scheme for exemplar behaviour.	
l	Training/toolbox talks are provided for site operatives.	Ask for copies of a schedule of talks.	
m	The site has a record of social/community activities.	See documentation to check compliance.	

14.3 Technical Checklist A3: Man 3 Construction Site Impacts

1a. Monitor, report and set targets for CO_2 production of energy use arising from site activities		
Compliance requirement	**Tick**	**Evidence/Reference**
Monthly measurements of energy use will be/has been recorded and displayed on site.		
Appropriate target levels* of energy consumption will be/were set and displayed (targets could be annual, monthly, or project targets).		
As a minimum, monitoring will/did include checking the meters and displaying some form of graphical analysis in the site office to show consumption over the project duration and how actual consumption compares to the targets set.		
The design/site management team will/did nominate an individual who will be responsible for the monitoring and collection of data.		
* Notes: • Targets for energy consumption during the construction process should be set using Constructing Excellence' Environmental KPI benchmarks. These documents do not specify targets but facilitate projects in setting appropriate targets. www.constructingexcellence.org.uk/zones/kpizone/default.jsp. • BREEAM does not require targets to be met but is encouraging the process of setting, monitoring and reporting against targets.		
1b. Monitor and report CO_2 or energy arising from transport to and from the site		
Compliance requirement	**Tick**	**Evidence/Reference**
A site monitoring system will be/was in place to monitor and record deliveries*. This system will/did record: • The number of deliveries • The mode of transport • The km/miles travelled for all deliveries		
If the design team or contractor confirms that the project is aiming to achieve the '*Construction Site Transport, measures for traffic movements and distances*'[10] then this aspect has been achieved automatically. The information obtained for this item can also be used to satisfy the Constructing Excellence' Environmental KPI on transport.		
The design/site management team will/did nominate an individual responsible for the monitoring and collection of data.		

Notes:

- Where the delivery is specifically for the site, a figure of total distance travelled should be used, i.e. a round trip (from the point of origin, to the site and back to the point of origin).
- Where the delivery to the site is part of a multiple delivery route, the recorded figure for distance travelled should be the distance travelled to the site (from the previous delivery), plus the distance to the next delivery or return.
- This information can then be used to estimate a total figure for kg of CO_2 for the project. BREEAM does not require this information to be converted to CO_2 but the information must be made available to the senior project and site management staff/suppliers to establish benchmarks and aid future decision-making towards improving site and transport efficiency. If the project team wishes to convert this information into CO_2 emissions there are tables provided at the end of this checklist which can be used to do this.

1c. Monitor, report and set targets for water consumption arising from site activities

Compliance requirement	Tick	Evidence/Reference
Monthly measurements of water consumption will be/were recorded and displayed on site.		
Appropriate target* levels of water consumption will be/were set and displayed (targets could be annual, monthly or project targets).		
As a minimum, monitoring will/did include checking the meters and displaying some form of graphical analysis in the site office to show consumption over the project duration and how actual consumption compares to targets set.		
The design/site management team will/did nominate an individual responsible for the monitoring and collection of data.		

Notes:

- Targets for water consumption during the construction process should be set using Constructing Excellence' Environmental KPI benchmarks. These documents do not specify targets but facilitate projects in setting appropriate targets. www.constructingexcellence.org.uk/zones/kpizone/default.jsp.
- BREEAM does not require targets to be met but is encouraging the process of setting, monitoring and reporting targets.

1d. Adopt best practice policies in respect of air (dust) pollution arising from site activities

Compliance requirement	Tick	Evidence/Reference
The site will/did adopt best practice procedures in relation to minimising air/dust pollution. This should include: • 'dust sheets' • regular proposals to damp down the site in dry weather • covers to skips etc.		
This information will be/was disseminated to site operatives.		

Notes:

- Further information can be obtained from BRE/EA publications 'Control of Dust from Construction and Demolition Activities'[10] and Pollution Control Guide Parts 1-5[11] provide good practice guidelines on construction related pollution.

1e. Adopt best practice policies in respect of water (ground and surface) pollution occurring on the site		
Compliance requirement	**Tick**	**Evidence/Reference**
The site will/did adopt best practice procedures in relation to minimising impact, as outlined in the following documents. PPG 1 - General guide to the prevention of pollution. Environment Agency PPG 5 - Works in, near or liable to affect watercourses. Environment Agency PPG 6 - Working at demolition and construction sites. Environment Agency		
This information will be/was disseminated to site operatives.		

1f. A main contractor with an environmental materials policy		
Compliance requirement	**Tick**	**Evidence/Reference**
The main contractor operates an environmental materials policy, used for sourcing of construction materials to be utilised on site. The policy should cover/promote the following: • Use of local materials (where possible) • Use of responsibly sourced materials • Re use of materials • Use of materials with a high recycled content • Waste minimisation and recycling • Use of non-toxic materials & refrigerants with a low global warming potential • Use of materials with a low embodied impact • Use of durable materials		
Post construction: indicative examples have been provided to demonstrate the policy in action.		

1g. A main contractor that operates an Environmental Management System*		
Compliance requirement	**Tick**	**Evidence/Reference**
The main contractor operates an Environmental Management System covering their main operations. The EMS must be either: • Third party certified, to ISO14001/EMAS or equivalent standard. OR • The structure of the EMS is in compliance with British Standard 8555 2003 and has reached phase four of the implementation stage, 'implementation and operation of the environmental management system', and completed phase audits one to four, as defined in BS8555.		

2. 80% of site timber is reclaimed, re-used or responsibly sourced		
Compliance requirement	**Tick**	**Evidence/Reference**
80% of timber used during construction, including formwork, site hoardings and other temporary site timber used for the purpose of facilitating construction, will be/was procured from sustainably managed sources, independently certified by one of the top two levels as set out in the Responsible Sourcing of Materials Issues (BREEAM issue Mat 5) in the Materials section of this document.		
Additionally 100% of all site timber will be/was legally sourced.		
Notes: • Re-used timber from off site can be counted as equivalent but re-usable formwork only complies if it meets the above criteria. • This credit can be awarded where all the timber used is reclaimed timber.		

Existing building fit out assessment only items (Offices/Education/Retail/Industrial/Healthcare/Bespoke schemes only)

1. Adopt best practice policies in respect of air (dust) pollution arising from site activities		
Compliance requirement	**Tick**	**Evidence/Reference**
The site will/did adopt best practice procedures in relation to minimising air/dust pollution. This should include: • 'dust sheets' • regular proposals to damp down the site in dry weather • covers to skips etc.		
This information will be/was disseminated to site operatives.		
Notes: • Further information can be obtained from BRE/EA publications 'Control of Dust from Construction and Demolition Activities' and Pollution Control Guide Parts 1-5 provide good practice guidelines on construction related pollution.		
2. Appointment of a fit out contractor who has an environmental materials policy		
Compliance requirement	**Tick**	**Evidence/Reference**
The fit out contractor operates an environmental materials policy, used for sourcing of construction materials to be utilised on site. The policy should cover/promote the following: • Use of local materials (where possible) • Use of responsibly sourced materials • Re use of materials • Use of materials with a high recycled content • Waste minimisation and recycling • Use of non-toxic materials & refrigerants with a high global warming potential • Use of materials with a low embodied impact • Use of durable materials		
Post construction: indicative examples have been provided to demonstrate the policy in action.		
3. Appointment of a fit contractor who operates an Environmental Management System		
Compliance requirement	**Tick**	**Evidence/Reference**
The fit out contractor operates an Environmental Management System covering their main operations. The EMS must be either: • Third party certified, to ISO14001/EMAS or equivalent standard. OR • The structure of the EMS is in compliance with British Standard 8555 2003 and has reached phase four of the implementation stage, 'implementation and operation of the environmental management system', and completed phase audits one to four, as defined in BS8555.		

Assessor Information

Monitoring Site Transport CO_2

The following tables are taken from the DEFRA '*Guidelines for Company Reporting on Greenhouse Gas Emissions*' and COPERT II emission factors, and can be used to convert the information gathered from monitoring deliveries into total kg CO_2.

Table 26 Standard road transport fuel conversion factors

Fuel used	Total units used	Units	x	kg CO_2 per unit	Total kg CO_2
Petrol		litres	x	2.30	
Diesel (inc. Low Sulphur)		litres	x	2.63	
Compressed Natural Gas		kg	x	2.65	
Liquid Petroleum Gas		litres	x	1.49	

Source: National Atmospheric Emissions Inventory for 2003 developed by Netcen (2005). UK Greenhouse Gas Inventory for 2003 developed by Netcen (2005), Digest of UK Energy Statistics DTI 2004 and carbon factors for fuels from UKPIA (2004)

Table 27 Standard road transport fuel conversion factors

Size of car and distance units	Total units travelled	Units	x	kg CO_2 per unit	Total kg CO_2
Small petrol car max. 1.4 litre engine		miles	x	0.26	
		km	x	0.16	
Medium petrol car max. 1.4-2.1 litre engine		miles	x	0.30	
		km	x	0.19	
Large petrol car above 2.1 litres		miles	x	0.35	
		km	x	0.22	
Average petrol car		miles	x	0.29	
		km	x	0.18	

Source: NAEI (Netcen, 2005) based on data from DfT combined with factors from TRL as functions of average speed of vehicle derived from test data under real world testing cycles

Table 28 Standard Road Transport Fuel Conversion Factors					
Size of car and distance units	**Total units travelled**	**Units**	**x**	**kg CO_2 per unit**	**Total kg CO_2**
Small Diesel car 2.0 litres engine and under		miles	x	0.26	
		km	x	0.16	
Large Diesel car over 2.0 litres - 2.1 litre engine		miles	x	0.31	
		km	x	0.19	
Average Diesel car		miles	x	0.27	
		km	x	0.17	

Source: NAEI (Netcen, 2005) based on data from DfT combined with factors from TRL as functions of average speed of vehicle derived from test data under real world testing cycles.

Table 29 Freight road mileage conversion factors							
Type of lorry	**Total km travelled**	**x**	**Litre Fuel per km**	**x**	**Fuel Type**	**Fuel Conversion Factor**	**Total kg CO_2**
Articulated		x	0.35	x	Petrol	2.30	
					Diesel	2.63	
					LPG	1.49	
Rigid		x	0.40	x	Petrol	2.30	
					Diesel	2.63	
					LPG	1.49	

Source: Guidelines for Company Reporting on Greenhouse Gas Emissions, DEFRA. Continuing Survey of Road Goods Transport 2001.

14.4 Technical Checklist A4: LE3 Land of Low Ecological Value

Section 1: Ecological features of the site		
Instruction: criteria 1.1-1.5 can be used to determine the presence of existing ecological features across the total site. However, if YES is recorded against **any** question in Section 1 for the *construction zone,* then it cannot be defined as *land of low ecological value* and the credit cannot be awarded. If the *construction zone* records a NO against **all** the questions in Section 1 then proceed to Section 2.		
1.1	Does the site contain any trees or hedges above 1m high or with a trunk diameter greater than 100mm?	YES ☐ NO ☐
1.2	Are there any ponds, streams or rivers on, or running through the site?	YES ☐ NO ☐
1.3	Is there any marsh or other wetland present on the site?	YES ☐ NO ☐
1.4	Are there any meadows or species-rich grassland present on the site?	YES ☐ NO ☐
1.5	Is there any heath land such as heather present on site?	YES ☐ NO ☐
Section 2: Type of land to be used for the new building		
Instruction: in addition to answering NO to all the questions in Section 1, if YES is recorded against one or more of the questions in Section 2 then the *construction zone* can be defined as *land of low ecological value*. This credit can then be awarded, as long as all features of ecological value (as defined in Section 1) in the surrounding site and boundary area are adequately protected from damage.		
2.1	Does the *construction zone* consist of land which is entirely within the footprint of existing building(s) or building(s) demolished within the past 2 years?	YES ☐ NO ☐
2.2	Does the *construction zone* consist of land which is entirely covered by other construction such as hard surfaces, car parking or such constructions which have been demolished within the past two years?	YES ☐ NO ☐
2.3	Does the *construction zone* consist of land which is contaminated by industrial or other waste to the extent that it would need decontamination to facilitate development?	YES ☐ NO ☐
2.4	Does the *construction zone* consist of land which is a mixture of either existing building(s), hard surfaces and/or contaminated land?	YES ☐ NO ☐
2.5	Does 80% of the land within the *construction zone* comply with statements 2.1, 2.2 or 2.3 and the remaining 20% of the footprint of the *construction zone* extend into land which has been either: a. Used for single-crop arable farming for at least 5 years, OR b. Consists of regularly cut lawns and sports fields	YES ☐ NO ☐

14.5 Technical Checklist A5: Mat 5 Responsible Sourcing of Materials

Table 30 Checklist of criteria for Tiers 1-4

Tier	Criteria	Examples of compliant schemes	Checklist of documentation required
1	Third party certification scheme with CoC and rigorous stakeholder consultation (at both standard setting and during implementation) Scheme must have developed standards which meet the criteria outlined in Table 32 Features of a top tier (1) comparable certification scheme: Standard setting (below).	FSC CSA SFI with CoC PEFC Reused materials, Schemes compliant with BES6001:2008 (or similar) Excellent* and Very Good* Performance Ratings (Note; the EMS required to achieve these ratings must be independently certified)	**Design** One of the following indicating that the material will comply with the relevant certification scheme. o Letter of intent from supplier OR o Purchase order from the supplier including CoC number (if the material has been ordered) or BES6001:2008 Certificate number OR o Chain of Custody (CoC) or BES6001 certificate (if material has already been supplied)
			Post Construction • A copy of the CoC certificate and/or BES6001:2008 certificate for all appropriate materials/elements. AND • Delivery notes for all appropriate materials/elements.
2a	Third party certification scheme with CoC and stakeholder consultation. Scheme must have developed standards which meet the criteria outlined in Table 32 Features of a top tier (1) comparable certification scheme: Standard setting (below).	Schemes compliant with BES6001:2008 (or similar) 'Good' Performance Rating (Note: the EMS required to achieve this rating must be independently certified**).	As above.
2b		Schemes compliant with BES6001:2008 (or similar) 'Pass' Performance Rating (Note: the EMS required to achieve this rating must be independently certified).	

Tier	Criteria	Examples of compliant schemes	Checklist of documentation required
3	Certification Scheme for timber Environmental Management System at **extraction & process stages** - see Table 31 Diagram of how the required EMS relates to the process and extraction phases (below) for description of stages.	ISO 14001 EMAS Evidence of BS8555 (for SME's) MTCC Verified** SGS TFT	**Design** <u>Timber</u> One of the following indicating that the material will comply with the relevant certification scheme. o Letter of intent from supplier OR o Purchase order from the supplier including CoC number (if the material has been ordered) OR o Chain of Custody (CoC) certificate (if timber has already been supplied) <u>Non timber materials</u> One of the following indicating that the material will comply with the relevant EMS standards (see issue for further information). • EMS (or equivalent) certificate from the manufacturers at the process and extraction stages OR • Signed letter from the manufacturers at the process and extraction stages confirming EMS (or equivalent) certification details OR • Letter of intent from the developer to use a manufacturer at the process and extraction stages, who has an EMS (or equivalent), if supplier is not yet appointed.

Tier	Criteria	Examples of compliant schemes	Checklist of documentation required
3			**Post Construction** • Delivery notes for all appropriate elements <u>Timber</u> • CoC certificate for all appropriate elements <u>Non timber materials</u> One of the following indicating that the material will comply with the relevant EMS standards (see issue for further information). • EMS certificate (or equivalent) from the manufacturers at the process and extraction stages OR • Signed letter from the manufacturers at the process and extraction stages confirming EMS (or equivalent) certification details In addition: • Delivery notes for all appropriate elements
4	Environmental Management System at **process stages** for other materials - see Table 31 Diagram of how the required EMS relates to the process and extraction phases (below) for description of stages.	EMAS ISO 14001	**Design** One of the following indicating that the material will comply with the relevant EMS standards (see issue for further information). • EMS (or equivalent) certificate from the manufacturers at the process stage OR • Signed letter from the manufacturers at the process stage confirming EMS (or equivalent) certification details OR • Letter of intent from the developer to use a manufacturer at the process stage, who has an EMS (or equivalent), if supplier is not yet appointed.

Tier	Criteria	Examples of compliant schemes	Checklist of documentation required
			Post Construction One of the following indicating that the material will comply with the relevant EMS standards (see issue for further information). • EMS certificate (or equivalent) from the manufacturers at the process stage OR • Signed letter from the manufacturers at the process stage confirming EMS (or equivalent) certification details.

* Performance ratings for schemes compliant with BES6001:2008 (or similar) can only be used to demonstrate compliance with the criteria of this issue where certification covers the key process and supply chain processes for the material being assessed.

** 'Verified' is the name of a scheme

To view a list of products approved to BES6001:2008 (including copies of their certificates) visit: www.greenbooklive.com/page.jsp?id=169

Where ANY non certified timber is used (even if only a small quantity) the following must also be provided in ALL cases:

- Written confirmation from the timber supplier(s) (or at the design stage of assessment, the developer where a supplier is not yet appointed) confirming that all timber species and sources used in the development are not listed on any of the CITES appendices for endangered and threatened species (see issue for further information).
- Written confirmation from the timber supplier(s) (or at the design stage of assessment the developer where a supplier is not yet appointed) confirming that all timber is to be legally sourced (see issue for further information).

Table 31 Diagram of how the required EMS relates to the process and extraction phases

Stage of production process	Extraction	Process	Manufacture
Materials	Stone	Bricks	
	Aggregate (sand, limestone etc.)	Cement or alternative	Concrete / blocks
	Hematite	Glass	
	Bauxite	Metals	
	Clay	Other materials (plastic etc)	Composites
	Raw materials - other	Pre-cast concrete	
Points available	1.5 points	1 point	

As this issue is looking at responsible sourcing, currently the manufacture stage is not considered.

NOTE TO ASSESSORS

This list is included for information, you are not expected to evaluate whether a scheme complies with this criteria. All new schemes claiming to meet the criteria listed below will be evaluated by BRE, and will be included in the list of compliant schemes where appropriate.

Table 32 Features of a top tier (1) comparable certification scheme: Standard setting

When setting standards for a materials certification scheme the following should be addressed in order to be considered comparable to Tier 1/2 of this issue.

- The scheme must include a third party chain of custody certification scheme covering all stages of the product throughout the supply chain
- The scheme must verify that all local and national legislative criteria are met.
- The process for policy and standards development is transparent, clear and accessible.
- The scheme is independent and standards are developed in a way which balances the interests of all stakeholders. This should be done through a rigorous consultation process which makes best use of the stakeholder knowledge, methodically and comprehensively considering all feedback and after such consideration, aims to implement all feasible stakeholder suggestions
- The scheme is inclusive, striving to involve all interested people and groups in the development of the scheme's policies and standards.
- Monitoring and assessment must be integral to the scheme and conducted appropriate to the scale and intensity of the industry/ materials assessed by the scheme. This requirement is likely to be fulfilled by the incorporation of an EMS such as ISO14001 or BS8555 for SME's.
- The scheme should contain principles by which the scheme should be governed. These should be specific to industry/materials but should also be composed of the fundamental issues related to the environment. These issues should focus on specific practices associated with sourcing virgin and other materials.
- The scheme should assess that initiatives are in place to ensure continuous performance and environmental improvement.
- The scheme should provide for small to medium sized business as well as larger businesses. SME's grouping together to achieve group certification should be an option. This could, for example, take place on a regional or other relevant basis.
- The scheme should include a mechanism to revise the standard within a defined, suitable time frame to ensure that the current knowledge or upcoming robust scientific or other professional evidence can be incorporated (in good time) into the standard as an update. It should ensure that all updates are well adapted to the local/regional and/or global conditions.
- The scheme should also aim to consider social and economic aspects widening the scope to sustainability under the umbrella of a Corporate Social Responsibility (CSR). This is in line with the future aims of BREEAM and could be assessed within this issue in the future.

NOTE: The scheme may be generic for the materials industries or specific for individual materials sectors.

Differences between Tier 1&2

Tiers 1 and 2 follow the standard setting process outline above, however there are differences in the rigour of the two schemes which is why they fall into two different categories. These are outlined below:

1. The top tier category schemes comprehensively address a consultation process with local community. This is done at source via a management company, as the focus is on sustainable project management at source.
2. The top tier category must have no reservations/uncertainty/pending charge or indictment identified by any professional bodies in the relevant materials sectors.

14.6 Technical Checklist A6: Guidance for relating ecologist's report to BREEAM

Before completing this form please read the following:

1. This guidance document is to be used for BREEAM 2008 assessments, where an ecologist has been appointed and produced an ecology report as part of a proposed development.
2. As an ecologist may have been appointed to carry out ecological site surveys and produced an ecology report without being aware that a BREEAM assessment has been, or is to be conducted, the purpose of this document is to help assist assessors relate the contents of such a report to the land use and ecology criteria of BREEAM.
3. The assessor is to request that the appointed ecologist complete all sections of this guidance and return it to the BREEAM assessor along with all relevant documentation required to demonstrate compliance with the BREEAM criteria.
4. The assessor is to use this completed document in conjunction with the latest version of the relevant BREEAM technical guidance manual and information provided by the developer / client to carry out the assessment of the land use and ecology BREEAM issues.

- There are 6 sections (sections A - F) in this document.
- Section A requires contact details for the ecologist and developer / client.
- Section B1 determines whether the appointed ecologist is '*suitably qualified*' (under BREEAM); and if not, section B2 determines whether the report has been verified by an ecologist who is '*suitably qualified'*.
- Section C determines whether the findings of the report have been based on data collected from site surveys conducted at appropriate times of the year to determine whether different species are evident.
- **If 'no' is recorded for either Section B or C then the contents of the ecology report cannot be used to determine compliance with the BREEAM criteria.**
- Section D provides the BREEAM assessor with the necessary information to complete the assessment of the ecology related BREEAM issues.
- Section E provides details of the documentation / information required by BREEAM as evidence of compliance.
- Section F requires the signature of the appointed ecologist who has completed this document.

Please note: it is only the appointed qualified and licensed BREEAM assessor who can award or withhold a credit for all BREEAM assessments.

Section A: Contact Details

Ecologist's Details

Company name:

Company address:

Contact name:

Contact telephone number:

Ecology report reference:

Developer / Client Details

Company name:

Company address:

Contact name:

Contact telephone number:

Section B1: Ecologist's Qualifications

1. Do you hold a degree (or equivalent qualification, e.g. N/SVQ level 5) in ecology or related subject?

   Yes ☐ No ☐

   If yes, please provide details……
   ……
   ……

2. Are you a practising ecologist with a minimum of 3 years relevant experience within the last 5 years? *Relevant experience must clearly demonstrate a practical understanding of factors affecting ecology in relation to construction and the built environment and will include acting in an advisory capacity to provide recommendations for ecological protection, enhancement and mitigation measures, e.g. ecological impact assessments.*

   Yes ☐ No ☐

   If yes, please provide details……
   ……
   ……
   ……
   ……
   ……
   ……

3. Are you bound by a professional code of conduct and subject to peer review*?

*i.e. a **full member** of one of the following organisations will be deemed suitable: Chartered Institution of Water and Environmental Management (CIWEM); Institute of Ecology and Environmental Management (IEEM); Institute of Environmental Management and Assessment (IEMA); Landscape Institute (LI).*

Yes ☐ No ☐

If yes, please provide details……..
…….

** Peer review is defined as the process employed by a professional body to demonstrate that potential or current **full members** maintain a standard of knowledge and experience required to ensure compliance with a code of conduct and professional ethics.*

If 'no' has been answered for any question in Section B1 then the BREEAM requirement for a '*suitably qualified ecologist*' has not been met. The ecology report CANNOT be used to assess the BREEAM Ecology issues unless it is verified by an individual who is '*suitably qualified*' (see section B2 below).

Section B2: Report Verification

Details on verifying an ecology report for a BREEAM assessment:

1. The individual verifying the report must provide written confirmation that they comply with the definition of a '*suitably qualified ecologist*' (as detailed in Section B1 above).

2. The verifier of the report must confirm in writing they have read and reviewed the report and found it to:

    - represent sound industry practice
    - report and recommend correctly, truthfully, and objectively
    - be appropriate given the local site conditions and scope of works proposed
    - avoid invalid, biased, and exaggerated statements.

Written confirmation from the third party verifier on all the points detailed under 1 and 2 above (for section B2) must be included in an appendix to this guidance (see section E).

If the appointed ecologist does not meet the criteria of a '*suitably qualified ecologist*' and the report has not been verified by an individual who does meet these criteria, then the report CANNOT be used as evidence of compliance with the ecology related BREEAM.

Section C: Site Survey

1. Have the findings of the ecology report been based on data collected from a site survey(s)? *The site visit(s) and survey(s) must be conducted at appropriate times of the year when it is possible to determine the presence, or evidence of the presence, of different plant and animal species.*

   Yes ☐ No ☐

   If yes, please provide details to justify this (e.g. date(s) and scope of site survey(s))

   ……
   ……
   ……
   ……
   ……
   ……
   ……
   ……
   ……
   ……
   ……
   ……

   If 'no' has been answered to question 1 of Section C then the ecology report CANNOT be used to determine compliance with the criteria of the relevant BREEAM ecology issues.

   Note to suitably qualified ecologist and BREEAM assessor: the contents of the ecology report must be representative of the site's existing ecology prior to the commencement of initial site preparation works, i.e. before RIBA stage K, Construction to Practical Completion, and after RIBA stage B, Design Brief.

Section D: Site Survey Details

LE3 Ecological value of land and protection of ecological features

1. Is the land within the '*construction zone*' deemed by the *suitably qualified ecologist* to be of low ecological value?

   The construction zone is defined as any land on the site which is being developed (and therefore disturbed) for buildings, hard standing, landscaping, site access, plus a 3m boundary in either direction around these areas. It also includes any areas used for temporary site storage and buildings.

   Yes ☐ No ☐

   If yes, please provide a brief statement explaining how it has been deemed to be of low ecological value:

   ……
   ……
   ……
   ……
   ……
   ……
   ……

2. Are there any features / areas of ecological value that fall within the site, but outside the *construction zone*?

   If you have deemed this area to be of low ecological value then there will be no features of ecological value to protect. However, if there is a feature(s) or area(s) of low ecological value you wish to advise be retained and enhanced, e.g. a species-poor hedgerow to a species-rich hedgerow, then full details of the protection and enhancement advice should be entered under LE5 Enhancing site ecology.

   Yes ☐ No ☐

p.t.o

If yes, please provide a brief statement outlining the advice / recommendations given for protecting **all** existing features and areas of ecological value:

……
……
……
……
……
……
……
……

LE4 Mitigating ecological impact

3. Are you able to provide the following information for before and after construction:
   - habitat types
   - An estimate of the number of floral species present per habitat type (based on appropriate census techniques and confirmed planting regimes)?

   Yes ☐ No ☐

   a. If yes a brief description of the landscapes and habitats surrounding the development site

   ……
   ……
   ……
   ……
   ……
   ……
   ……

   b. The total site area (in m^2). *This will be the same before and after development.*

   ……

p.t.o

c. Please fill in the table below with site details before development[1]:

Habitat Type*	Area of type (m_2)	No. of plant species per habitat type

d. Please fill in the table below with site details after development[1]:

Habitat Type*	Area of type (m_2)	No. of plant species per habitat type

* Habitat types will include natural areas, e.g. various grasslands and woodlands; as well as areas of the built environment, e.g. buildings, hard landscaping. The area of each habitat type when added together must always equal the total area of the development site.

[1] *Note to assessor (and ecologist where requested to carry our calculations); the information contained in tables c. and d. above can be used to calculate both LE4 Mitigating ecological impact and LE5 Enhancing site ecology issues.*

p.t.o

4. Has the client / developer requested you to carry out the calculation for LE4 Mitigating ecological impact and /or LE5 Enhancing site ecology (where relevant)?

   The calculations must be carried out in line with the methodology provided in the current version of the relevant BREEAM scheme's technical guidance manual.

   Yes ☐ No ☐

   If yes, please provide all stages of calculations and state what the total change in ecological value is:

   a. Calculation of *ecological value* before development:

   ……

   ……

   ……

   ……

   ……

   b. Calculation of *ecological value* after development:

   ……

   ……

   ……

   ……

   ……

c. Change in *ecological value* (c = b – a):

……

……

……

……

……

LE5 Enhancing site ecology

5. Has the client / developer required you to provide advice and make recommendations for enhancing site ecology?
   Note: these are to include, and go beyond, compliance criteria for all current EU and UK legislation relating to protected species and habitats.

   Yes ☐ No ☐

   If yes, please provide a brief statement outlining the advice / recommendations given on enhancing and protecting the ecological value of the site:

……

……

……

……

……

……

LE6 Long term impact on biodiversity

6. Were you appointed prior to commencement of development work activities on site?

   Yes ☐ No ☐ Don't know ☐

7. Has the client / developer given you the responsibility to confirm whether all current EU and UK legislation relating to protection and enhancement of ecology has been (or will be) complied with during the design and construction process?

   Yes ☐ No ☐

If yes, please provide details on all current EU and UK legislation that relates to the site:

……

……

……

……

……

……

……

……

……

……

8. Has the developer / client appointed you to produce an appropriate landscape/site ecology management plan covering at least the first 5 years after project completion?

   Yes ☐ No ☐

   EITHER:

   a. If yes, and the management plan has already been produced does it include the following:
      - management of any protected features on site
      - management of any new, existing, or enhanced habitats
      - a reference to the current or future site level Biodiversity Action Plan?

      Yes ☐ No ☐

   OR

   b. If yes, but the management plan is still to be produced (due to it being too early in the design/construction phase), have you provided the following information to the developer / client:
      - scope of management plan
      - key responsibilities, and with whom these responsibilities lie, e.g. owner, landlord, occupier?

      Yes ☐ No ☐

   If you have answered 'yes' to either question 8a or 8b please provide a brief explanation outlining the details

   ……..

   ……..

   ……..

   ……..

   ……..

9. Has the client / developer required you, as part of your responsibilities, to provide recommendations and advice to minimise detrimental impacts on site biodiversity?

   Yes ☐ No ☐ N/A ☐

   If yes, or not applicable, please briefly explain your reasoning:

   ……..

   ……..

   ……..

   ……..

   ……..

10. Do your responsibilities to the client / developer include providing advice and recommendations for the protection of ecological features?

    Yes ☐ No ☐ N/A ☐

    If yes, or not applicable, please briefly explain your reasoning:

    ……..

    ……..

    ……..

    ……..

    ……..

    ……..

    ……..

11. Do your responsibilities to the client / developer include providing advice on the creation of a new ecologically valuable habitat, which is appropriate to the local area and is either nationally, regionally, or locally important, or supports nationally, regionally, or locally important biodiversity?

    Yes ☐ No ☐ N/A ☐

    If yes, or not applicable, please briefly explain your reasoning:

    ……..

    ……..

    ……..

    ……..

    ……..

    ……..

    ……..

12. Do your responsibilities to the client / developer include providing advice and recommendations on when site works are to be avoided so as to minimise the disturbance to wildlife?

    Yes ☐ No ☐ N/A ☐

    If yes, or not applicable, please briefly explain your reasoning

    ……..

    ……..

    ……..

    ……..

    ……..

    ……..

Section E: Schedule of Evidence

Copies of the following documentation are required to support the above statements and act as evidence of compliance with the BREEAM ecology criteria:

- The *suitably qualified ecologists* site/project specific report
- Written confirmation from the verifier of the ecology report (where necessary)
- Any supplementary documentation e.g. maps, plans, drawings, letters / emails of correspondence, etc.

Please include these details along with the appropriate reference to each document in the table below:

Document	Reference

Section F: Statement of Verification

I confirm the information provided on this document is truthful and accurate at the time of completion.

Name of ecologist: ……

Signature of ecologist:: ……

Date: ……

15.0 Schedule of Changes to the Scheme Document

The table below details the changes/additions to each issue of this BREEAM 2008 Scheme Document, the table also outlines the issue number (and therefore date) the change came into affect.

Where an Assessor/user has been using or referencing an issue of the Scheme Document that has subsequently been superseded, they may continue to use and reference that issue of the Scheme Document through to certification. Or alternatively, they may switch to the latest issue for the purposes of completing and certifying the building. When submitting a certification report the BREEAM Assessor is asked to stipulate in the report which issue of the Scheme Document they have used to complete the assessment of the building. If two different issues were used throughout the course of the assessment, reference the latest issue used.

Issue number	Date of issue
1.0	24/6/2008
2.0	14/08/2008
3.0	31/07/2009
4.0	01/05/2010
4.1	25/05/2012

Key (Type of Change)	
A	Administrative change e.g. typo, re-wording of text, minor addition to the text.
C	An addition/insertion, deletion or alteration to the scope, assessment criteria, Compliance Notes, evidence required or relevant definitions.
AG	An addition/insertion, alteration or deletion to the additional guidance and supporting information/references.

Issue ID / Section	Type	Change	Issue no.
Front Cover	A	The front cover and inside page has been **updated** with the updated BREEAM logo and certification mark. The text on the inside page about BRE Global Ltd has been updated.	4.1
Schedule of changes	AG	An **additional paragraph** has been **added** to the introduction to the schedule of changes section. This provides **guidance** to assessor/user of the scheme document on the **use of the new issue** where they have previously been using a superseded issue to carryout the assessment.	4.0
Front cover	A	The front cover and inside page has been **updated**. The Standard number has been replaced with a Scheme Document number.	4.0
Scope	C	**Section 2.2** *Type of projects that can be assessed using BREEAM* has been **updated**, specifically: A **definition** of New Construction has been **added**. The **definition** of major and minor refurbishment has been **amended** to provide additional guidance on the appropriate use of BREEAM for these types of project.	4.0

Issue ID / Section	Type	Change	Issue no.
Scope	C	The **scope of the Education** scheme has been **extended** to enable **Fit out assessments**; as such fit out criteria has been **added** to the scheme document.	4.0
Scope	C	**Pre-school buildings** (nurseries and children centres) have been **added** to the **scope of BREEAM Education** and can be assessed regardless of whether they form part of a wider school site or stand alone facility/building. As such the text in the scope section addressing 'stand alone nursery buildings' has been removed and descriptions in the **assessment criteria updated** accordingly.	4.0
Scope	AG	Additional **guidance** has been **added** to the scope section on which guidance/criteria to use for assessing **'all age range schools'** and **'academies'**.	4.0
Scoring and weighting	C	**Guidance** has been **added** to section 3.3 (minimum standards) concerning the application and **exemption of the minimum standards** to refurbishment and fit out projects. This is in accordance with the communication in the March 2010 BREEAM Assessors process note.	4.0
Man 2	C	A **compliance note** has been **added** on the issue of which **CCS** monitors report to use for the purpose of determining the number of BREEAM credits, where there have been multiple CCS monitor visits and reports.	4.0
Man 12	C	The **term** "non discounted" has been **removed** from requirement 3 of the first credit. Essentially there is no difference between the term real and non discounted cash flow. A definition from ISO15686 for real and discounted cash flow has been added to the additional information section.	4.0
Hea 8	C	**Evidence required** table **amended** to include a description of the required evidence for criterion 3.	4.0
Hea 8	AG	The **reference** to the **definition of occupied space** in the relevant definitions section has been **removed** as 'occupied space' is not referred to in the criteria.	4.0
Hea 9	C	The **following paragraph** has been **removed** from the Additional Information section: "*Wood products that contain phenol-formaldehyde (PF) generally emit formaldehyde at considerably lower rates than those containing urea-formaldehyde (UF). Although formaldehyde is present in both types of resins, pressed woods that contain PF would be preferable to those containing UF resin*."	4.0
Hea 9	C	A **compliance note** has been **added** concerning floor finishes and compliance with BS EN 14041 in relation to Formaldehyde emissions and the **reference** to BS EN 13986 has been **updated**.	4.0
Hea 17	C	The **criteria** has been **amended** to clarify that for schools, compliance with BB88 is satisfactory for BREEAM compliance and the use/compliance with British Standards is only required if relevant to the installation. A **compliance note** has also been **added** to this affect.	4.0
Ene 2	AG	**Reference added** to CIBSE TM39 Building Energy Metering.	4.0
Ene 3	AG	A **definition** of Energy Supply, and therefore what should be metered, has been **added** to the Additional Information section	4.0
Ene 8	C	A **compliance note** has been **added** outlining exemptions to this issue i.e. simple platform/wheelchair lifts and ramps.	4.0
Ene 8	C	A **compliance note** has been **added** concerning compliance with the requirement for optimising the counterbalance ratio.	4.0
Ene 10	C	A **compliance note** has been **added** concerning the applicability of ICT suites to the requirements of this BREEAM issue.	4.0

Issue ID / Section	Type	Change	Issue no.
Ene 11	C	The **reference** to the use of GPG320 has been **removed from the assessment criteria** and replaced by criteria requiring the specification of recirculatory filtered fume cupboards (for schools). A **compliance note** has also been **added** clarifying the approach to be used where ducted fume cupboards are required. As a result of changes to requirement 1 of this issue, **requirement 2** has been **amended** and the evidence required updated.	4.0
Ene 11	C	The **compliance note** entitled "Requirements 1 & 2" has been **removed** due to the changes to the criteria (as outlined above). A separate **compliance note** "Requirement 2 for schools and sixth form" has been **added**.	4.0
Ene 11	C	The **compliance note** Fume cupboard face velocity made reference to a face velocity of 5 m/s, this should read 0.5 m/s. It has been **amended** accordingly.	4.0
Ene 19	C	The **text in requirement 2** for buildings with laboratory function areas where *the laboratory area accounts for at least 25% of the total building floor area*, has for clarity in accordance with the intention of the credit, been **changed** from "where the first credit is achieved". to "Where fume cupboards and/or other containment devices are specified, the first credit is achieved".	4.0
Tra 1	C	**Additional text added** to the **compliance note** concerning "Compliant public transport node" to clarify that national public transport services should not be included in the calculation of AI.	4.0
Tra 3	C	A **compliance note** has been **added** concerning the **provision of compliant showers** in primary schools where the requirement for provision of cycle storage spaces is reduced by 50% in city centre and rural locations.	4.0
Tra 3	C	The **compliance note** "Compliant showers" has been **amended** for **higher education buildings** to confirm that one shower is required for every 10 (staff) cycle storage racks), not every 10 staff.	4.0
Tra 3	C	The **compliance note** "Nursery building on an existing site" has been **deleted** as pre-schools/nurseries now form a formal part of the Education schemes scope (and therefore criteria).	4.0
Tra 3	C	A **compliance note** has been **added** giving guidance for projects where a **proprietary (manufactured) cycle system** has been specified. This note is in accordance with the guidance published in the June 2009 Assessors Process note	4.0
Tra 6	C	In issue 3.0 of the guidance this BREEAM credit was labelled as applicable to Further Education buildings; this was an **error** and in accordance with issue's 1.0 and 2.0, this has been **amended** in issue 4.0.	4.0
Wat 3	C	**Criteria requirement 2b** stated "….a flow rate above a pre-set minimum for a pre-set period of time", the word "**minimum**" has been **changed** to "**maximum**" in accordance with the objective of the requirement.	4.0
Mat 1	C	**Compliance note added** explaining how the Exemplary level criteria requirements should be assessed where the **building contains no upper floor**.	4.0
Mat 1	C	**Definition** and **Compliance note added** concerning the new Online **Green Guide Calculator**.	4.0
Mat 1	AG	Information **added** to the Additional Information section concerning floor finishes, specifically guidance on selecting the appropriate **floor finishes** category on the Green Guide online.	4.0
Mat 1	AG	A definition of **element number** has been **added** to the Additional Information section.	4.0

Issue ID / Section	Type	Change	Issue no.
Mat 5	C	Tier 2 in the **responsible sourcing table** has been **split** in to **tier 2a and 2b**. This is in accordance with the guidance in December 2009 BREEAM Assessor's process note, to differentiate certification schemes that achieve a Good rating from those that achieve a Pass rating under BES:6001 Responsible Sourcing Standard.	4.0
Mat 5	AG	The **calculation procedure** for the **Mat 5 calculator tool** in the additional guidance section of issue Mat 5 has been **updated** in accordance with the communication in the December 2009 BREEAM Assessor's process note and the introduction of an online responsible sourcing tool. A definition added for the online Responsible Sourcing Calculator	4.0
Mat 5	C	A note has been **added** alongside the **Responsible Sourcing Criteria and Tier Levels** table regarding **PEFC International's endorsement of the MTCC** scheme and therefore the circumstances in which MTCC certified timber can be considered as a tier 1 compliant scheme. This change is in accordance with the guidance communicated to assessors in the July 2009 edition of the Assessors Process note.	4.0
Mat 5	C	The **note** concerning **in-situ concrete** in the table of responsible sourcing tier levels and criteria has been **updated** to clarify the requirement for concrete mixed on site. Also, a **note** has been **added** at the bottom of the responsible sourcing table containing guidance on the need for a **certified EMS** for products/manufacturers certified against **BES6001:2008**. This is in accordance with the communication to BREEAM Assessors in the September 2009 process note.	4.0
Mat 5	C	A **compliance note** has been **added** concerning the responsible sourcing of insulation materials, specifically making the reader aware that this is covered in BREEAM issue Mat 6 *Insulation*.	4.0
LE6	C	In the **compliance note**: "Not all additional items are applicable" where there are only four items applicable, the requirements to achieve one credit has been **amended** from "three additional items" to "two additional items" to bring in line with the standard requirement for achieving the first credit available for this issue.	4.0
Pol 2	C	A **compliance note** has been **added** concerning appropriate action for refrigeration systems that use **ammonia** as a refrigerant.	4.0
Pol 2	C	The **compliance note** concerning awarding the credit by default where **Carbon Dioxide** has been used as the refrigeration has been **updated** to include a requirement that the system must comply with the BS EN 378 and Institute of Refrigeration code of practice for Carbon Dioxide.	4.0
Pol 4	C	The **factor** given for **converting** figures in **mg/MJ to mg/kWh** is subject to a **formatting error**. Previous issue stated that figures in mg/MJ should be divided by 3.6, when in fact they should be multiplied. This has been **amended**.	4.0
Pol 4	C	A **formula** has been **added** to the additional information section for determining **NO_x** emissions from **heat pumps**.	4.0
Pol 5	C	**Requirement 3 referred to notes 6 & 7**, this should refer to the compliance notes. The reference to notes 6 & 7 is a legacy from the BREEAM 2006 version. The guidance has been **amended** accordingly.	4.0
Pol 8	C	Following a review, due to the less onerous requirements of Pol 8 compared to Hea 13, the **definition** of a **suitably qualified acoustician** from issue 2.0 has been **reinstated**.	4.0

Issue ID / Section	Type	Change	Issue no.
Inn 1	AG	The **definition** of an **Accredited Professional** has been **updated.**	4.0
Inn 1	AG	The **text** "Procedure for reviewing applications for BREEAM Innovations" in the additional guidance section has been **updated**.	4.0
Inn 1	C	The **Suitably Qualified Assessor** route as a means of achieving the relevant two BREEAM Innovation credits has been **removed**. The credits can now only be achieved through the use of a BREEAM AP. In accordance with the communication in the November 2009 BREEAM Assessors process note.	4.0
Inn 1	C	**Text added** to the **schedule of evidence** required table to confirm the type of information required for demonstrating compliance with **requirement 7** at the interim design stage for the appointment and use of a BREEAM AP	4.0
Scope	C	**Higher Education Institutes** have been **added** to the list of building types that can be assessed using the Education scheme. As a result of this extension in scope there are new additions to the assessment criteria (detailed below). The scope has also been **updated** to account for the various types of schools e.g. academies, all age-range schools etc.	3.0
Scope	A	The text in the '*stages of assessment'* section relating to the timing of the post construction assessment has been **changed from:** "*A PCS assessment is carried out after practical completion of the building works, before handover and occupation of the building.*" **To:** "*A final PCS assessment is completed and certified after practical completion of the building works*."	3.0
Technical sections	C	The following **presentational changes** have been made to the technical sections: The credit criteria boxes and compliance requirements have been **merged** to create one section for each issue called "*Assessment Criteria*". The header and footers in the technical sections have been **amended**. The issue ID information, numbers of credits available and minimum standards requirements now appear only at the top of each BREEAM issue requirement (as opposed to the header on every page under issues 1.0 and 2.0).	3.0
References	AG	The references section for each issue has been moved to a compiled references section at the back of the Scheme Document. References used in the assessment criteria text are numbered and correspond to a number in the new references section. In addition, other publications are referenced by BREEAM issue for further reading/guidance in a new section *Additional Sources of Information*.	3.0
Innovation	C	A new section titled Innovation has been **added** (section 13). This section summarises the three methods of achieving innovation credits in BREEAM.	3.0
Scoring & weighting	C	The text in the Innovation part of the scoring and weighting sections has been modified to reflect the insertion of Section 13 Innovation.	3.0
Man 1	C	Second credit - seasonal commissioning: Requirement b) has been **added** to list of criteria for simple systems. This brings the criteria for simple systems in line with those for complex systems with respect to actions following on from the initial seasonal commissioning review.	3.0
Man 1	C	The compliance note concerning '*commissioning manager (simple systems)' has* been **modified** to remove the ambiguity over the	3.0

Issue ID / Section	Type	Change	Issue no.
		monitor / manager role.	
Man 2	C	The exemplary level criteria for this issue have been **re-worded** for clarity and consistency with the main BREEAM criteria. The requirement itself i.e. CCS benchmark to achieve the innovation credit, remains unchanged.	3.0
Man 1	C	Additional requirements **added** for laboratory spaces for higher education buildings (requirement 8a and 8c). These changes form part of the extension of scope of the Education scheme to include Higher Education establishments.	3.0
Man 4	C	Additional credit and requirements **added** covering the development of a specific user guide for laboratory spaces for higher education buildings. These changes form part of the extension of scope of the Education scheme to include Higher Education establishments.	3.0
Man 6	C	Requirements 4, 5 & 6 and a compliance note defining *appropriate stakeholders* has been **added**. These additions form part of the extension of scope of the Education scheme to include Higher Education establishments.	3.0
Man 7	C	Compliance note re. existing shared facilities **expanded** to confirm that shared facilities within an existing building on the site/campus comply, provided the facility is accessible to all relevant stakeholders.	3.0
Man 9	C	Compliance note **added** concerning publication of information where the building is of a secure or sensitive nature. This addition forms part of the extension of scope of the Education scheme to include Higher Education establishments.	3.0
Man 10	C	Compliance note **added** concerning types of building for which this credit is not applicable. This addition forms part of the extension of scope of the Education scheme to include Higher Education establishments.	3.0
Man 12	C	The RIBA stages terminology has been **updated**. The reference to figure 6 in ISO 15686-part 1 in requirement 4 was incorrect and has been **changed** to ISO 15686-part *5*.	3.0
Hea 1	C	The compliance note '*percentage of assessed area'* has been **modified** and text **added** concerning the view out requirement.	3.0
Hea 1	C	A compliance note has been **added** confirming the percentage of a room (compliant with the average daylight factor requirement) that must meet the view out requirement.	3.0
Hea 1	C	An additional requirement of the first credit and a second credit has been **added** for higher educational buildings. A compliance note has also been **added** concerning laboratory spaces and daylight. These additions form part of the extension of scope of the Education scheme to include Higher Education establishments.	3.0
Hea 2 & 3	C	Additional text has been **added** to the requirements of Hea 2 concerning areas of the building that are over 7m from a windowed wall. The compliance note in Hea 2 & 3 concerning 'excluded areas' has also been **updated** to account for higher educational building spaces/functions.	3.0
Hea 7	C	The compliance note concerning 'excluded areas' has been **updated** to account for higher educational building spaces/functions.	3.0
Hea 13	C	For clarity, the measurement procedures referred to in the compliance note and in the additional guidance have been labelled as specific to "*Further Education only*" to avoid confusion over which measurement/testing requirements should be followed for the	3.0

Issue ID / Section	Type	Change	Issue no.
		purpose of schools assessments. A compliance note has been **added** concerning the application of the requirement for rain noise in schools and heavyweight roof constructions. The text for the first requirement has been **changed from** "*All spaces in the building achieve the performance standards required by Building Bulletin 93*" **to** "*The building meets the acoustic performance standards required by Building Bulletin 93*." The text in bold has been added to requirement 5 under the third credit for schools: '*Calculation or measurements demonstrate that the increase in the indoor ambient noise level during 'heavy' rainfall does not exceed the levels defined in Table 1.1 of Building Bulletin 93 by more than 20dB* ***for all occupied spaces (including school and sports halls)*****'**. The word '*relevant*' has been **included** in the following design stage schedule of evidence requirement: '*The specific performances standards achieved for each relevant room/area*'. The word '*tested* has been **included** in the following post construction stage schedule of evidence requirement: '*The required performance levels have been achieved for each tested room/area of the completed building*'.	
Hea 13	C	The requirements of the third credit for **schools** have been **amended** to account for lightweight and heavyweight roofs. A compliance note has also been **added** concerning the type of data to use when carrying out calculations of rain noise for the purpose of assessing compliance with this credit.	3.0
Hea 13	C	The compliance note and additional guidance concerning *measurement procedures* has been **amended**. The first requirement of the first credit for Further and Higher Education building types has been **amended** to confirm that this requirement applies to non teaching areas i.e. spaces/rooms not covered in BB93. The second requirement concerns teaching areas (including labs).	3.0
Hea 16	C	A compliance note has been **added** concerning the non applicability of this issue to higher education building types.	3.0
Hea 3	C	A compliance note has been **added** concerning the application of this issue for workshops.	3.0
Hea 6	C	A definition of '*separate occupant control'* has been added.	3.0
Hea 11	C	A definition of '*separate occupant control'* has been added.	3.0
Hea 17	C	Requirement 1 has been **modified** from: '*Specified fume cupboards are manufactured and installed in accordance with BS EN 14175-2*.' **To**: '*Specified fume cupboards are manufactured and installed in accordance with the following:* *a. General purpose fume cupboards: BS EN 14175-2* a. *Recirculatory filtration fume cupboards: BS 7989'* *b. Schools and sixth form colleges: Building Bulletin 88 (in addition to the above British Standards where applicable).* Text has been **added** to requirement 2 to highlight that this requirement applies only to ducted fume cupboards.	3.0

Issue ID / Section	Type	Change	Issue no.
Ene 1	C	The compliance note '*Extensions to existing buildings'* has been **modified** to avoid confusion over the scope of the energy modelling and therefore CO_2 Index for the purposes of BREEAM.	3.0
Ene 5	C	A compliance note and relevant definition has been **added** concerning the types of biofuels that BREEAM will and will not recognise with respect to this BREEAM issue.	3.0
Ene 5	C	The compliance note '*Calculation of the CO_2 emissions saved'* has been **amended** to provide more clarity on the assumptions that should be used when modelling the building without the specified renewable technologies to determine the percentage reduction in CO_2 emissions.	3.0
Ene 3	C	The compliance note concerning relevant function areas / departments as been **amended** to account for higher education function areas.	3.0
Ene 6	C	The BREEAM issue Ene 6 has been **added** to the Education scheme. This issue is applicable to higher education buildings types only.	3.0
Ene 7	C	The BREEAM issue Ene 7 has been **added** to the Education scheme. This issue is applicable to higher education building types only.	3.0
Ene 10	C	In the Schedule of Evidence table requirement 1 has **changed from** "*Evidence as required for BREEAM issue Hea 11*" **to** "*Evidence as required for BREEAM issue Hea 10*".	3.0
Ene 11	C	A compliance note has been **added** concerning the non applicability of this BREEAM issue to higher education buildings.	3.0
Ene 11	C	The following compliance note has been added: '***Requirements 1&2:*** *When following the guidance in GPG 320 and choosing the most energy efficient fume cupboard strategy, all relevant guidelines and recommendations contained in Building Bulletin 88, BS EN 14175-2 and BS7989 (as applicable) should also be followed.*'	3.0
Ene 19	C	This is a **new BREEAM issue**, relevant to **Higher Education** assessments only.	3.0
Ene 20	C	This is a **new BREEAM issue**, relevant to **Higher Education** assessments only.	3.0
Tra 1 & 2	C	Additional requirements have been **added** for the purpose of assessing higher education building types.	3.0
Tra3	C	An **addition** has been made to the requirement for the second credit confirming that, for **primary schools only**, *building users* are defined as *staff only*, not staff and pupils.	3.0
Tra 3	C	Requirement 1 and 2 and the compliance note concerning building users and compliant shower facilities have been **amended** to account for the inclusion of higher education building types. The compliance note concerning compliant cycle facilities as also been **amended** with respect to distance to facilities on **further education** campus'.	3.0
Tra 6	C	An assessment criterion has been **added** for Higher Education building types.	3.0
Tra 7	C	Tra 7 *Travel Information Space* has been **included** and is specific to higher education building types only.	3.0

Issue ID / Section	Type	Change	Issue no.
Tra 8	C	The following has been **added** to the '***small buildings***' compliance note for this BREEAM issue: '*Also, requirement 3 'delivery areas are not be accessed through parking areas' can be relaxed for smaller sites if it can be confirmed that all deliveries to the building will be made by small vans and not heavy goods vehicles.*'	3.0
Wat 1	C	'*Purchase orders*' **added** to the list of evidence types that can be provided for demonstrating compliance with the criteria at the post construction stage of assessment.	3.0
Wat 2	C	The first exemplary level requirement has been **amended** to confirm the minimum percentage water demand that must be met by an individual item of water consuming plant or building area to achieve the innovation credit. A compliance note has also been **added** in support of this requirement.	3.0
Wat 2	C	A new requirement has been **added** concerning the metering of laboratory equipment. These additions form part of the extension of scope of the Education scheme to include Higher Education establishments.	3.0
Wat 5	C	A new requirement has been **added** concerning the use of recycled water from building processes in laboratory areas in higher education building types.	3.0
Wst 3	C	The word "*up to*" has been **replaced** by the words "*with an*" in requirement 2c to read: "*An additional 2m^2 per 1000m^2 of net floor area where catering is provided (**with an** additional minimum of 10m^2 for buildings ≥5000m^2)*".	3.0
Mat 1	AG	Additional guidance **added** for further and higher education building types concerning which Green Guide building type to select for the purpose of determining Green Guide ratings for the elemental specifications.	3.0
Mat 1	AG	A note in the Additional Information section has been **added** concerning the Green Guide flooring category and Indoor Air Quality.	3.0
Mat 1	A	A note has been **added** to the schedule of evidence table concerning Green Guide element numbers.	3.0
Mat 5	C	BRE Global's responsible sourcing framework standard BES6001:2008 has been added to tiers 1 and 2 of Table 15 Responsible Sourcing Tier Levels and Criteria. The Green Dragon Environmental Standard® **added** as an EMS compliant scheme (tiers 3 and 4 of responsible sourcing table) for small companies. The schedule of evidence table for this issue has also been **updated** accordingly.	3.0
Mat 5	C	The text '*Future RSM certification schemes & standards*' in the additional guidance section has been **replaced** with text concerning the BRE Global responsible sourcing standard BES6001:2008.	3.0
Wst 3	C	The compliance note concerning multiple building assessments has been **revised** to clarify the assessment of this issue where a building forms part of a wider estate.	3.0
LE1	C	The text in the schedule of evidence table for requirement 1 of this issue has been **changed from** "*previous land use*" **to** "*Type and duration of previous land use".*	3.0

Issue ID / Section	Type	Change	Issue no.
LE4	C	The following text has been **added** to the compliance note '***Number of plant species'***: '*Where an ecologist has been appointed actual number of plant species (before and after construction), based on the ecologists site survey should be used to determine the change in ecological value*.'	3.0
LE3	C	The following text has been **added** to the compliance note '*Use of a suitably qualified ecologist*' as a **clarification**: '*Where a suitably qualified ecologist is employed and has, using their professional judgement, defined the site as land of low ecological value, this assessment/judgement overrides any assessment determined using checklist A4*.' The following has been **added** to the compliance note *'Site clearance prior to purchase of the site'* as a **clarification**: '*Where it is not possible for the ecologists to determine that the site was of low ecological value prior to the site clearance then the credit must be withheld.*'	3.0
LE5	C	The compliance note '*Native Species'* has been **re-named** '*Plant Species'*. The text in the compliance note has been **modified from**: '*Only native floral/plant species and those with a known attraction or benefit to local fauna can be considered for the purpose of increasing the number of species on site, as well as general enhancement*.' **To:** '*Only native floral/plant species, and/or those contributing to a local or UK Biodiversity Action Plan or those with a known attraction or benefit to local fauna can be considered for the purpose of increasing the number of species on site, as well as general enhancement*. *The Natural History Museum has an online Postcode Plants Database which generates lists of native plants and wildlife for any specified postal district in the UK. http://www.nhm.ac.uk/nature-online/life/plants-fungi/postcode-plants/index.html*'	3.0
Pol 8	C	Text has been **added** to the requirement concerning the relevant definition of a *suitably qualified acoustician.* This text refers to the definition provided in BREEAM issue Hea 13, for consistency.	3.0
Checklist A5	C	The checklist has been **updated** to reflect the inclusion of BES6001:2008 in to the responsible sourcing tiers.	3.0
Checklist A3	C	The wording in requirement f) of checklist A3 referred to the use of materials and refrigerants with a "high" global warming potential. This has been **changed** to read materials & refrigerants with a "low" global warming potential.	3.0
Man11	A	Reference 1: '*Guide to Ownership, Operation and Maintenance, CIBSE 2000*' **deleted**. Reference 1: *'Guide M: Maintenance Engineering and Management, CIBSE, 2008.'* **inserted**.	2.0
Man12	C	The wording of requirement 1 of the first credit has been changed from '*A Life Cycle Cost (LCC) analysis has been carried out based on the feasibility study proposals during RIBA Work Stages B (feasibility) and C (outline proposals), or equivalent*' **to** '*A Life Cycle Cost (LCC) analysis has been carried out based on the proposals developed during RIBA Work Stages B/C (feasibility study/outline proposals), or equivalent'*.	2.0

Issue ID / Section	Type	Change	Issue no.
Man12	C	The wording for requirement 6 of the first credit has been **changed from** '*The model was updated during Stages D (detailed proposals) and E (final proposals), or equivalent.*' **to** '*The model was updated during RIBA Work Stages D/E (detailed/final proposals) or equivalent*.'	2.0
Ene3	C	The following text '*Further Education Colleges only*' in the credit criteria section has been **deleted**. The text "*Further Education colleges and secondary schools only*" has been **inserted** in its place. This change is in line with the Assessment Criteria for this issue.	2.0
Ene5	A	The word '*production*' **deleted** and the word '*reduction*' **inserted** in requirement 3 of the second and third credit and exemplary level criteria.	2.0
Ene5	C	Air Source Heat Pumps have been **added** to the list of heat pumps that can be considered as low or zero carbon technologies.	2.0
Ene5	C	In the compliance note 'List of recognised LZC technologies' the following text has been **deleted** '*The following technologies are recognised by the Department for Business, Enterprise and Regulatory Reform (BERR) as low or zero carbon (LZC) technologies under the Low Carbon Buildings Programme and would be deemed acceptable for BREEAM provided that the relevant percentage outputs are achieved:'* The following text has been **inserted** in its place*:* '*Technologies recognised by the Department for Business Enterprise and Regulatory Reform (BERR) Low Carbon Buildings Programme (LCBP) may be considered as part of a low or zero carbon emissions solution. The following list details the technologies recognised by the BERR, LCBP at the time of going to print'.*	2.0
Ene5	C	The following text has been **inserted** to the compliance note 'List of recognised LZC technologies': '*The list above is not a definitive list of technologies compliant with BREEAM, but a list of those technologies that may be considered to comply. If the assessor has a justified reason to doubt the low or zero carbon credentials/feasibility of the above technologies, when applied/installed on the development they are assessing, they can justifiably withhold the available BREEAM credits.'*	2.0
Ene5	C	The following text has been **deleted** from the 'Biomass community heating schemes' listing in the compliance note 'List of recognised LZC technologies': *'where the majority of the heat comes from biomass'.*	2.0
Ene10	C	Requirement 2 **changed from** '*The BREEAM issue Hea11 Thermal Comfort has been achieved*' **to** '*The BREEAM issue Hea10 Thermal Comfort has been achieved*'. This change is necessary as the previous requirement referenced the wrong BREEAM issue.	2.0
Tra1	C	The title of the following definition has been changed **from** '*Public Transport Accessibility Calculator*' **to** '*Tra1 Provision of Public Transport calculator'.*	2.0
Tra3	C	The compliant locker size has been **changed from** '*400mm x 200mm x 400mm*' **to** '*900mm X 300mm X 450mm or a locker with dimensions that provide an equivalent volume of storage space*'. The previous defined locker size is deemed to small to adequately store a cyclists equipment e.g. clothes, helmet, towel, bag etc.	2.0
Tra3	C	Two tier cycle stands **deleted** from the list of 'Non compliant cycle racks' in the Compliance Notes. This type of stand can comply with BREEAM's definition of 'Compliant cycle storage space'.	2.0

Issue ID / Section	Type	Change	Issue no.
Tra8	C	The following compliance note as been **inserted** *'No vehicle delivery and manoeuvring areas: This BREEAM issue is not assessed where the development does not have a vehicle delivery and manoeuvring area. In such cases this issue will be filtered from the list of relevant credits by the assessor's spreadsheet tool.'*	2.0
Wat1	AG	Guidance on the use of the Wat1 Calculator (applicable to schools only) has been **added** to the additional guidance section.	2.0
Wat4	A	The word '*teach*' has been **deleted** from requirement 1, second bullet point. The word '*each*' has been **inserted** in its place.	2.0
Mat1	AG	Guidance has been **inserted** in to the additional guidance section describing how the Mat 1 calculator determines the number of credits achieved using the Green Guide ratings achieved for each of the specifications/elements assessed.	2.0
Mat 1	AG	The following 'relevant definition' has been **inserted**: *'Ecopoint: The Ecopoint used in the Green Guide online is single score that measures the total environmental impact of a product or process as a proportion of overall impact occurring in Europe - 100 Ecopoints is equivalent to the impact of a European Citizen. Green Guide ratings are derived by sub-dividing the range of Ecopoints/m^2 achieved by all specifications considered within a building element.'*	2.0
Mat5	C	The instructions, in the additional guidance section, on using the responsible sourcing calculator have been **updated**.	2.0
Mat 1, 2 & 6	C	The requirement to provide a Green Guide element reference number, in addition to the Green Guide rating, for each elemental specification **inserted** in to the 'Schedule of Evidence Required'. The element reference number is provided along with each Green Guide rating on the online version of the Green Guide to Specification.	2.0
Wst1	AG	The table of Construction Waste Groups has been **updated**.	2.0
Wst2	C	The following has been **added** to the list of secondary aggregate types: "*Municipal Solid Waste Treatment Residues*".	2.0
Wst3	C	The header has been **amended** to clarify the minimum standard criteria for the 'Excellent' and 'Outstanding' rating levels for this BREEAM issue.	2.0
LE1	C	In the compliance note 'School playing field' the word '*school*' has been **deleted** from the compliance note title and text. In the compliance note text the words "*within the construction zone*" have been **inserted** in to the first line of the compliance note.	2.0
LE1	C	A definition of '*Construction zone*' has been **added** to the relevant definitions section.	2.0
Pol4	C	The word *'maximum'* has been **deleted** from the criteria and criteria of this BREEAM issue. This change has been made to avoid doubt over the validity of a manufacturer's statement on the tested NO_x emissions of their products, which are often stated in 'average' dry NO_x emission levels.	2.0
Pol5	C	The following compliance note has been **inserted**: '*Functional flood plain: The BREEAM credit for locating in a flood zone of 'medium or high annual probability' cannot be awarded where the building is located in the functional flood plain. PPS25[9] defines the functional flood plain as a 'zone [that] comprises land where water has to flow or be stored in times of flood'. If the building assessed is or has been defined as 'water-compatible development', please refer to the BREEAM office for guidance on assessing this BREEAM issue*.'	2.0

Issue ID / Section	Type	Change	Issue no.
Pol5	AG	Updated Reference: BS EN 752:1998 '*Drain and sewer systems outside buildings*' has been superseded by BS EN 752:2008.	2.0

16.0 Additional Sources of Information

Information listed by BREEAM issue.

Man 1

- AG16/2002 - *Variable flow water systems: design, installation and commissioning guidance*
- *Photovoltaics in buildings - Testing, commissioning and monitoring guide*, S/P2/00290/REP.

Man 3

- Sustainability Action Plan (or Achieving Sustainability in Construction Procurement); Government Construction Client's Panel (GCCP), Office of Government Commerce (OGC).
- *Guidelines for Company Reporting on Greenhouse Gas Emissions*, Annex 6 Transport conversion tables, DEFRA 2002.
- *COPERT II Computer programme to Calculate Emissions from Road Transport - Methodology and Emissions Factors*, Technical report No 6. http://reports.eea.eu.int/TEC06/en
- Good Practice Guide (GPG) 273, *Computerised Routing and Scheduling for Efficient Logistics,* Freight Transport Association, 2000.
- BS8555 2003 *Environmental Management Systems – Guide to the phased implementation of an environmental management system including the use of environmental performance evaluation,* BSI 2003.
- http://www.smartwaste.co.uk

Man 4

- Construction (Design and Management) Regulations 1994.
- BRE Digest 474 *HOBO protocol - Handover of Office Building Operations*, 2003.
- CIBSE Building Log Book Toolkit (CD-ROM) 2003.
- Carbon Trust : www.thecarbontrust.co.uk/carbontrust/
- www.teachernet.gov.uk
- www.dfes.gov.uk

Man 6

- Design Note 14 *School & Community – 2*, DES, 1976.
- www.bcse.uk.net
- www.ltl.org.uk

Man 7

- *Designed with care: design and neighbourhood healthcare buildings,* CABE, 2006. www.cabe.org.uk

Man 8

- Building Bulletin 100, *Design for Fire Safety in Schools*, 2007.
- Managing School Facilities, Guide 4 - *Improving Security in Schools*, DFEE, 2006.

Man 9

- http://www.constructingexcellence.org.uk/
- http://www.wellbuilt.org.uk/lascn/login.jsp

Man 10

- Building Bulletin 95 Schools for the Future – *Designs for learning communities*, DfES 2002.

Man 11

- Building Bulletin 70, *Maintenance and renewal in educational buildings, maintenance of mechanical services,* DfES.

Man 12

- BS/ISO 15686-5 *Service Life Planning – Life Cycle Costing*, BSI.
- OGC guidance Achieving Excellence in Construction 7 – *Whole Life Costing and Cost Management*.
- OGC guidance Achieving Excellence in Construction 11 – *Sustainability*.
- Green Book – Treasury guidance *Appraisal and Evaluation in central government*. Crown Copyright 1997 and 2000.
- HM Treasury, *How to construct a public sector comparator - Technical Note No. 5*, Treasury Taskforce, London 1999.
- CCF *Whole Life Costing - A Clients' Guide, BRE report funded by DETR*. Clients Construction Forum London: 1999.
- BS/ISO 15686 Buildings *Service Life Planning - Part 1 - General Principles,* BSI 2000.
- *Applying facilities expertise in building desi*gn, Jaunzens D, Warriner D, Garner U and Waterman A London: CRC Ltd.2001
- BRE Digest 452 *Whole life costing and life cycle assessment for sustainable building design*, Bartlett E, Edwards S, CRC, 2000.
- OGC Common Minimum Standards for the procurement of built environments in the public sector, downloadable from: http://www.ogc.gov.uk/documents/Common_Minimum_Standards_PDF.pdf
- Treasury's Value for Money (VfM) Initiative for PFI projects. Treasury website: http://www.hm-treasury.gov.uk./documents/public_private_partnerships/additional_guidance/ppp_vfm_index.cfm

Hea 1

- Lighting Guide 10 *Daylighting and window design*, CIBSE, 1999.
- *Site layout planning for daylight and sunlight, A guide to good practice*, P. J. Littlefair, BRE Press, 1998.
- Building Bulletin 90, *Lighting design for schools*, DfES, 1999.

Hea 2

- *Computers and Eyestrain*, E. Lawrence Bickford, O.D, The EyeCare Reports, 1996.

Hea 3

- Lighting Guide 10 *Daylighting and window design*, CIBSE, 1999.
- Lighting Guide 3 *The visual environment for display screen use*, CIBSE, 1996.

Hea 5

- Building Bulletin 87 *Guidelines for Environmental Design in Schools*, 2nd Edition Version 1, DFEE, 2003.

Hea 7

- The Building Regulations 2000 Approved Document F *Means of Ventilation*, ODPM, 2005.
- Good Practice Guide 290 *Ventilation and cooling option appraisal, a clients' guide*, The Carbon Trust.
- Building Bulletin 87 *Guidelines for Environmental Design in Schools* (Ventilation Section), DfES 2003.

Hea 8

- CIBSE TM 21 *Minimising pollution at air intakes*, 1999.
- Guide B *Heating, Ventilating, Air Conditioning and Refrigeration*, CIBSE, 2005.
- Guide A *Environmental Design*, CIBSE, 1999.
- ClassVent DfES 2006: www.teachernet.gov.uk

Hea 9

- Statutory Instrument 2005 No. 2773. *The Volatile Organic Compounds in Paints, Varnishes and Vehicle Refinishing Products Regulations 2005*, ISBN 0 11 073431 9.

Hea 10

- Report 345 *BRE's Environmental Design Guide for Naturally Ventilated and Daylit Offices*.
- CIBSE Guide J *Weather, solar and illuminance data*, CIBSE, 2002.
- ClassCool, DfES; 2006: www.teachernet.gov.uk/iaq

Hea 11

- Building Bulletin 87 *Guidelines for Environmental Design in Schools*, DfES, 2nd Edition Version 1, 2003.

Hea 12

- AG 10/94.1 *Efficient humidification in buildings*, KM Bennett, BSRIA.
- Health and Safety Executive, Legionnaires disease: http://www.hse.gov.uk/legionnaires/

Hea 13

- BS EN ISO 717-1 *Acoustics – Rating of sound insulation in buildings and of building elements. Part 1. Airborne sound insulation*, BSI, 1997.
- BS EN ISO 717-2 *Acoustics - Rating of sound insulation in buildings and of building elements. Part 2. Impact sound insulation*, BSI, 1997.
- BS EN ISO 140-7 *Acoustics – Measurement of sound insulation in buildings and of building elements. Part 7. Field measurements of impact sound insulation of floors*, BSI, 1998.

Hea 16

- *Water Cooler 'Point of Use' Guidance for Schools*, J Harvey, Health Education Trust, 2007. (http://www.wateriscoolinschool.org.uk) Includes a water provision checklist for schools and guidance for siting and selecting water dispensers and suppliers.
- www.foodinschools.org.uk DfES/DH website which contains the Water Provision Toolkit that contains guidance for selecting water dispensers.

Ene 1

- *Improving the energy efficiency of our buildings: A guide to energy performance certificates for the construction, sale and let of non-dwellings,* Communities and Local Government, 2008*.* http://www.communities.gov.uk/archived/publications/planningandbuilding/guidancenondwellingss
- Scottish Technical Handbooks: *Non-Domestic – Section 6: Energy*, Scottish Building Standards, 2007.

Ene 2

- CIBSE TM39 *Building energy metering - A guide to energy sub-metering in non-domestic buildings*, CIBSE, 2006.

Ene 4

- Lighting Guide 007 *Installers' Guide to the Assessment of Energy Efficient Lighting Installations*, Carbon Trust, 2004.

Ene 5

- Planning Policy Statement 22: *Renewable Energy*, ODPM, 2004
- Planning for Renewable Energy: *A Companion Guide to PPS22*, ODPM, 2004
- London Renewables Toolkit, available to download from http://www.london.gov.uk/mayor/environment/energy/renew_resources.jsp

Ene 7

- Food and Drink Industry Refrigeration Efficiency Initiative, Guide 2 *Purchase of Efficient Refrigeration Plant*, Food and Drink Federation, 2007.
- GPG 347 *Installing and Commissioning of Refrigeration Systems*, Carbon Trust, 2003.

Ene 8

- *Energy consumption and efficiency potentials of lifts*, Jürg Nipkow, Max Schalcher, Swiss agency for efficient energy use S.A.F.E.
- *Code of Practice for Energy Efficiency of Lift & Escalator Installations*, Electrical and Mechanical Services Department, HKSAR, 2007.
- Guide D *Transportation systems in buildings*, 2nd Ed, CIBSE, 2000.
- *Towards low carbon lifts*, G Barney (http://www.cibse.org/pdfs/2a%20Gina%20Barney.pdf)

Ene 10

- General Information Report 85 *New Ways of Cooling – information for building designers*, Carbon Trust, 2001

Ene 11

- Building Bulletin 88 *Fume Cupboards in Schools (Revision of Design Note 29)*, DEE, 1998

Ene 12

- CTV006 Sports and leisure *Introducing energy saving opportunities for business*, Carbon Trust, 2006

Ene 20

- ICT and sustainable development website: http://www.susteit.org.uk
- 2008 ASHRAE Environmental Guidelines for Datacom Equipment: http://tc99.ashraetcs.org/documents/ASHRAE_Extended_Environmental_Envelope_Final_Aug_1_2008.pdf

Tra 1

- *Transport Assessment Best Practice; Guidance Document*, Transport for London, 2006.

Tra 2

- Planning Policy Guidance Note 13 – *Transport*, Department for Transport, 2002.

Tra 3

- *Providing for cyclists - A code of practice*, Sustrans/cyclists' Public affairs group/CTC, 1997.
- Transport for London Street Management, *Cycle Parking Standards TfL Proposed Guidelines*, TFL.
- *London Cycling Design Standards*, Transport for London, 2005.
- BS 5489-1:2003 Code of practice for the design of road lighting, *Lighting of roads and public amenity areas*, BSI.
- Information Sheet FS19 *Cycle parking for schools*, Sustrans, 1999.

Tra 4

- Information Sheet FF04 *Shared Use Routes*, Sustrans, 1998.
- http://www.saferoutestoschools.org.uk/

Tra 5 & 6

- *A travel plan resource pack for employers*, DfT, 2000.
- *A good practice guide to green travel plans* BCO, 2004.
- *The Essential Guide to Travel Planning*, DfT, 2008.
- Transport Energy Best Practice, *A Guide on Travel Plans for Developers*, DfT, 2005.
- Traffic Advisory Leaflet 2/00, *Framework for a local walking strategy*, DETR, 2000.
- BS 8300:2001 *Design of buildings and their approaches to meet the needs of disabled people – code of practice*, BSI, 2001.

- Approved Document Part M *Access to and Use of Buildings*, ODPM, 2006.
- *Guidance on the use of Tactile Paving Surfaces*, DETR & the Scottish Office, 1998.
- *Building Sight*, RNIB, 1995.
- Safe Routes to Schools Information Sheet FS16 *Developing a School Travel Plan*, Sustrans, 2004.

Wat 5

- *Reclaimed water systems – information about installing, modifying or maintaining reclaimed water systems*, 9-02-04, WRAS 1999.
- BS EN 12056-3:2000: *Gravity drainage systems inside buildings. Roof drainage, layout and calculation*, 2000.

Mat 1 & Mat 2

- The Green Guide to Specification: www.thegreenguide.org.uk

Mat 5

- FERN - European NGO campaigning for forests (www.fern.org)
- ProForest (www.ProForest.net)
- WWF (www.panda.org)
- UK Tropical Forest forum (www.forestforum.org.uk)
- Greenpeace Ancient Forest Campaign (www.greenpeace.org.uk)
- Forests Forever Campaign (www.forestsforever.org.uk)
- UK Woodland Assurance Scheme (www.forestry.gov.uk/ukwas)
- Wood for Good (www.woodforgood.com)
- TFT - Tropical Forest Trust publication, *Good Wood, Good Business* (www.tropicalforesttrust.com)
- *Good Wood Guide*, Friends of the Earth/ Flora and Fauna International, 2002 (www.goodwoodguide.com)
- *The Environment in Your Pocket*, DEFRA, 2001.
- *Certification of Forest Products*, BRE, 1999.
- Briefing Sheet – The UK's Footprint: *The UK Timber Industry and its Impact on the World's Forest*, Friends of the Earth, 2000.
- Saving the Wood, Building for a Future (Autumn 2001)
- EU Eco-Management and Audit Scheme (EMAS) (www.emas.org.uk/aboutemas/mainframe.htm) (http://europa.eu.int/comm/environment/emas/index_en.htm)
- International Standards for Organisation (ISO) www.iso.org/iso/en/ISOOnline.frontpage
- EU Forest Law Enforcement, Governance and Trade (FLEGT) Action Plan (http://europa.eu.int/)
- SGS timber tracking programme (http://www.sgs.com/forest_services_?serviceId=8535&lobId=5548)
- Tropical Forest Trust (http://www.tropicalforesttrust.com/)
- Scottish Procurement Policy Note (SPPN (09)), *Procurement of Timber and Timber Products*, Scottish Procurement Directorate, 2005.

Wst 1

- For information and further advice on Site Waste Management Plans and to freely download BRE's new SMARTWaste Plan tool visit: www.smartwaste.co.uk
- Environment Agency guidance on waste: www.environment-agency.gov.uk/subjects/waste/ and www.netregs.gov.uk
- DEFRA provides information and associated guidance on the Site Waste Management Plan Regulations 2008: www.defra.gov.uk/constructionwaste
- For help in finding local waste management companies and opportunities to reuse and recycle materials try BREMAP free of charge at: www.bremap.co.uk

- Both WRAP and Envirowise can provide advice and guidance on SWMPs: www.wrap.org.uk/construction and www.envirowise.gov.uk
- www.remade.org.uk
- Waste Management Regulations Scotland www.aggregain.org.uk/waste_management_regulations/waste_management_regulations_scotland/index.html

Wst 2

- AggRegain website (managed by WRAP) has many case studies, guidance and specifications for using recycled and secondary aggregates: www.aggregain.org.uk
- BREMAP and Salvo Materials Information Exchange can help identify sources of recycled and secondary aggregates: www.bremap.org.uk and www.salvomie.co.uk
- MINRES website has technical information and case studies relating to the use of recycled and secondary aggregates in a number of high value applications e.g. bricks, concrete etc., and can also help users to locate sources of secondary aggregates: www.minres.co.uk

Wst 3

- *Metric handbook – Planning and design data*, Adler, Architectural Press, 2nd Ed., 1999.

LE1

- Designing for Sport on School Sites http://www.sportengland.org/designing_for_sport_on_school_sites.pdf

LE2

- CLEA Overview Documents (These and other documents relating to CLEA are available from the Environment Agency's website: www.environment-agency.gov.uk):
  - § CLR 7: Assessment of risks to human health from land contamination; an overview of the development of Soil Guideline Values and related research.
  - § CLR 8: Potential contaminants for the assessment of land.
  - § CLR 9: Contaminants in soil: collation of toxicological data and intake values for humans.
  - § CLR 10: The Contaminated Land Exposure Assessment (CLEA) model: technical basis and algorithms.
- Further advice and technical publications are available for download from the Environment Agency's website: www.environment-agency.gov.uk, including;
  - § Remedial methods for contaminated groundwater.
  - § Verification of treatment performance – How sure can you be?
  - § Issues for the selection of remedial strategies, good practice guidance.
  - § Process-based remediation of land contamination.
- Approved Document C *Site Preparation and Resistance to contaminants and moisture*, 2004 edition, ODPM. http://www.communities.gov.uk
- *Environment Agency Guidance on Criteria for Land Contamination Reports*, Environment Agency, 2005.
- Scottish Environment Protection Agency (SEPA) www.sepa.org.uk

LE3

- Institute of Ecology and Environmental Management's Guidelines for Ecological Impact Assessment in the United Kingdom www.ieem.net/ecia/index.html
- British Standard BS5837 *Trees in relation to construction*, BSI, 2005.
- *The Hedgerows Regulations 1997*, Office of Public Sector.
- Environmental good practice on site (CIRIA C502): *Guidance on how to avoid causing environmental damage and the financial penalties that can follow*, CIRIA, 1999.

- Environmental good practice on site (CIRIA C503): *Practical advice on how to carry out construction works without harming the environment*, CIRIA, 1999.
- Working with wildlife site guide (CIRIA C567): *Guidance to understand and implement good practice in relation to wildlife on development and construction projects*, CIRIA, 2005.
- *RSPB Good Practice Guide for Prospective Developments – General Principles, RSPB,* 1997: www.rspb.org.uk.
- Pollution Prevention Guideline (PPG) 5 *Works in, near, or liable to affect watercourses*, Environment Agency.
- Pollution Prevention Guideline (PPG) 6 *Working at construction and demolition sites*, Environment Agency.

LE5

- The Association of Wildlife Trust Consultancies www.awtc.co.uk
- Chartered Institution of Water and Environmental Management www.ciwem.org
- The Institute of Ecology and Environmental Management www.ieem.org.uk
- The Institute of Environmental Management and Assessment www.iema.net.
- Landscape Institute www.landscapeinstitute.org

LE6

- Earthwatch Europe: www.businessandbiodiversity.org
- Construction Industry Key Performance Indicators: www.kpizone.com
- Natural Environmental and Rural Communities Act, 2006: www.opsi.gov.uk
- *A Handbook of Good Practice for Public Bodies Dealing with Best Value and Biodiversity in Scotland*, The Scottish Government, 2004.
- Delivering the Scottish Biodiversity Duty: www.biodiversityscotland.gov.uk/duty/index.htm
- *Action for Scotland Biodiversity*, Scottish Biodiversity Group.

LE7

- Building Bulletin 71 *The outdoor classroom: educational use, landscape design and management of school grounds*, DfEE, 2nd edition, 1999.

LE8

- Wildlife Trusts: www.wildlifetrusts.org
- Earthwatch Institute (Europe): www.businessandbiodiversity.org
- UK Biodiversity Action Plan: www.ukbap.org.uk

Pol 1

- Guidance note 1 *New CFC's, HCFCs, HFC's and halons, Professional and practical guidance on substances that deplete the ozone layer*, CIBSE, 2000.
- *Code of practice for the minimisation of refrigerant emissions from refrigerating systems, Institute of Refrigeration*, Institute of Refrigeration, 1995.
- BS EN378-1:2000 *Refrigerating systems and heat pumps – Safety and environmental criteria – Part 1: Basic criteria, definitions, classification and selection criteria*, BSI, 2000.
- Institute of Refrigeration: www.ior.org.uk
- F-gas regulations: http://www.defra.gov.uk/environment/climatechange/uk/fgas/pdf/fluorgasreg-guidance.pdf

Pol 2

- *Code of practice for the minimisation of refrigerant emissions from refrigerating systems*, Institute of Refrigeration, 1995.
- Guidance Note 01 – *New CFC's, HCFC's, HFC's and halons, Professional and practical guidance on substances that deplete the ozone layer*, CIBSE, 2000.

- GPG 178 *Cutting the Cost of Refrigerant Leakage*, Carbon Trust, 1997.
- BSEN 378 1-4 *Refrigerating Systems and Heat Pumps – Safety and Environmental Requirement, British Standards Institution,* British Standards Institute, 2000.

Pol 4

- British Standards EN 297:1994. A1:1995, A2:1996, A3:1996, A5:1998 and A6:2003 *Gas-fired central heating boilers*, page 42, table 14, section 3.6.2
- *The United Kingdom's Programme and National Plan for Reducing Emissions of Sulphur Dioxide (SO2) and Oxides of Nitrogen (NOx) from Existing Large Combustion Plants*, Department of the Environment, Scottish Development Department, Welsh Office, Department of the Environment for Northern Ireland, (1990).
- *Nitrogen Dioxide in the United Kingdom*, Defra, 2004..
- Summary report also available on the National Atmospheric Emissions Inventory website at www.naei.org.uk

Pol 5

- C623 *Standards for the repair of buildings following flooding*, CIRIA, 2005.
- C523 *Sustainable urban drainage systems – best practice manual for England, Scotland, Wales and Northern Ireland*, CIRIA, 2001.
- C697 *The SUDS Manual*, CIRIA, 2007.
- *Flood estimation handbook, Centre for ecology and hydrology*, National Environmental Research Council, 1999.
- *Flood estimation for small catchments*, Marshall DCW and Bayliss AC. IOH Report No.124. Institute of hydrology, Wallingford, 1994.
- BRE Good Repair Guide 11 *Repairing Flood Damage*, Part 1-4, BRE Press, 1997.
- Development and Flood Risk *A Practice Guide Companion to PPS25* - A Consultation Paper, CLG, 2007.
- Planning Policy Wales Technical Advice Note 15: *Development and flood risk*, Welsh Assembly Government, 2004.
- Scottish Planning Policy 7 *Planning and flooding*, Scottish Executive, 2004.
- Planning Policy Statement 15 *Planning and flood risk*, DOE, 2006.
- BRE Digest 365 *Soakaway design*, BRE, 1991.
- BRESOAK Soakaway design software (2007) http://www.brebookshop.com/details.jsp?id=376
- The Environment Agency Flood Information: http://www.environment-agency.gov.uk/subjects/flood/
- Scottish Environment Protection Agency: www.sepa.org.uk/flooding/mapping
- The Met Office (incl. figures for UK rainfall): www.met-office.gov.uk

Pol 6

- Pollution Prevention Guideline (PPG) 1 *General guide to the prevention of pollution*, Environment Agency/SEPA/Environment & Heritage Service.
- *Groundwater Protection Policy*, Environment Agency, 2007.
- BS EN 752-4 *Drain and sewer systems outside buildings – Hydraulic design and environmental considerations*, British Standards Institute,1998.
- BS EN 12056-3 *Gravity drainage inside buildings – Roof drainage, layout and calculation*, British Standards Institute, 2000.
- Figures for UK rainfall are available from the Met Office www.met-office.gov.uk
- BRE Digest 365 *Soakaway design*, BRE 2003.

Pol 7

- *Guide on the Limitation of the effects of obtrusive light from outdoor lighting installation*, International Commission on Illumination (CIE), 2003.
- *Night blight!* Campaign to Protect Rural England (CPRE) www.cpre.org.uk/campaigns/landscape/light-pollution

17.0 References

[1] BSRIA Commissioning Guides:

- Application Guide 1/91 - Commissioning of VAV systems in Buildings
- Application Guide 20/95 - Commissioning of Pipework Systems
- Technical Memoranda 1/88.1 - Commissioning HVAC Systems
- Application Guide 3/89.3 - Commissioning of Air Systems in Buildings
- Application Guide 1/2001.1 - Pre-commission Cleaning of Pipework Systems
- Application Guide 2/89.3 - Commissioning of Water Systems in Buildings
- Application Guide 2/89.3 – Commissioning water systems application principles
- Application Guide 5/2002 - Commissioning Management

[2] CIBSE Commissioning Codes: Set of Seven Codes (2003)

- CIBSE Commissioning Code A: Air Distribution Systems
- CIBSE Commissioning Code B: Boilers
- CIBSE Commissioning Code C: Automatic Controls
- CIBSE Commissioning Code L: Lighting
- CIBSE Commissioning Code M: Management
- CIBSE Commissioning Code R: Refrigeration
- CIBSE Commissioning Code W: Water Distribution Systems

[3] Good Practice Guide 347: Installation and commissioning of refrigeration systems, Carbon Trust, 2003.

[4] Cold Store Code of Practice Part 1 *Enclosure Construction*, The Institute of Refrigeration, 1996.

[5] BS EN 14175-2:2003 Fume cupboards - Part 2: *Safety and performance criteria*, BSI, 2003.

[6] DD CEN/TS 14175-5:2006. *Fume cupboards. Recommendations for installation and maintenance*, BSI, 2007.

[7] BS EN 12469 – Biotechnology – Performance criteria for microbiological safety cabinets. BSI, 2000.

[8] Labs21 *Commissioning* section: http://www.labs21.org.uk/commissioning.htm

[9] Convention on International Trade in Endangered Species of Wild Flora and Fauna (CITES) http://www.cites.org/

[10] Construction site impacts - *BRE Publications:*

- *Control of Dust from Construction and Demolition Activities"*. V Kukadia, S Upton, D Hall BRE Press, 2003.
- *Controlling particles, vapour and noise pollution from construction sites"* - set of five Pollution Control Guides. V Kukadia, S Upton, C Grimwood, BRE Press, 2003.
- *Construction Site Transport:* The Next Big Thing, 2003, BRE and DTI. Available from: www.bre.co.uk/pdf/constructiontraffic.pdf

[11] Construction site impacts - Environment Agency publications:

- PPG 1 – *General guide to the prevention of pollution*. Environment Agency
- PPG 5 – *Works in, near or liable to affect watercourses*. Environment Agency
- PPG 6 – *Working at demolition and construction sites*. Environment Agency
- http://www.netregs.gov.uk/netregs/resources/278006/277807/?version=1&lang=_e

[12] DTI Construction Industry KPI Pack includes Methods of Measurement, Handbook, KPI Wall Chart, 2005. www.constructingexcellence.org.uk

[13] BS 5930 Code of practice for site investigations. BSI, 1999.

[14] BS 1377:1990 - Parts 1-9. *Methods of test for soils for civil engineering purposes*, BSI, 1990.

[15] BS 10175:2001 – *Investigation of potentially contaminated sites*, Code of practice, BSI, 2001.

[16] *Design Quality of PFI Schools*, BRE, 2002.
http://www.audit-commission.gov.uk/Products/NATIONAL-REPORT/D7701D4F-C130-4BA6-B10D-6D0644BDAA98/PFITechnicalqualityreportBRE.pdf)

[17] Secured by Design:

- http://www.securedbydesign.com/professionals/guides.aspx
- Car parks: http://www.securedcarparks.com and http://www.britishparking.co.uk

[18] *Secured By Design – Schools,* ACPO Crime Prevention Initiatives Limited, 2004.

[19] Building Bulletin 71 *The Outdoor Classroom*, 2nd Ed, DfES, 1999.

[20] Guide M: Maintenance Engineering and Management, CIBSE, 2008.

[21] ISO 15686 Buildings and constructed assets - Service life planning:

- Part 1 - General principles, 2000
- Part 2 - Service life prediction procedures, 2001
- Part 3 - Performance audits and reviews, 2002
- Part 6 - Procedures for considering environmental impacts, 2004

[22] Building Bulletin 98, *Briefing Framework for Secondary School Projects*, DfES

[23] Building Bulletin 99, *Briefing Framework for Primary School Projects*, DfES

[24] Information Paper IP 23/93 *Measuring daylight*, BRE, 1993.

[25] BS 8206 Lighting for buildings - *Code of practice for daylighting,* Part 2, 1992.

[26] *Code for Lighting,* CIBSE, 2006.

- Lighting Guide 1 *The Industrial Environment*.
- Lighting Guide 2 *Hospitals and Health Care Buildings* (including 2006 addendum)
- Lighting Guide 3 *The visual environment for dispaly screen use* (including 2006 addendum)
- Lighting Guide 4 *Sports* (including 2006 addendum)
- Lighting Guide 8 *Lighting for Museums and Art Galleries*
- Lighting Guide 9 *Lighting for Communal Residential Buildings*

[27] Building Bulletin 90 *Lighting Design for Schools*, DFEE, 1999.

[28] Lighting Guide 7 *Office Lighting*, CIBSE 2005.

[29] Lighting Guide 6 *The Outdoor Environment*, CIBSE 1992.

[30] CIBSE Lighting Guide 5 The Visual Environment in Lecture, Teaching and Conference Rooms, CIBSE, 1991 (and 2006 addendum).

[31] AM10 *Natural Ventilation in Non Domestic Buildings*, CIBSE, 2005.

[32] Building Bulletin 101 *Ventilation of School Buildings*, DfES 2006. www.teachernet.gov.uk

[33] BS EN 13986:2004 Wood-based panels for use in construction – Characteristics, evaluation of conformity and marking.

[34] BS EN 14080:2005 Timber structures – Glued laminated timber – Criteria.

[35] BS EN 14342:2005 Wood flooring – Characteristics, evaluation of conformity and marking.

[36] BS EN 14041:2004 Resilient, textile and laminate floor coverings. Essential characteristics.

[37] BS EN 13964:2004 Suspended ceilings. Criteria and test methods.

[38] BS EN 13999-1:2007 Adhesives – Short term method for measuring the emission properties of low-solvent or solvent-free adhesives after application – Part 1: General procedures.

[39] BS EN 233:1999. Wallcoverings in roll form – Specification for finished wallpapers, wall vinyls and plastics wallcoverings.

[40] BS EN 234: Specification for wallcoverings for subsequent decoration.

[41] BS EN 259-1:2001 Wallcoverings in roll form – Heavy duty wallcoverings – Part 1: Specifications.

[42] BS EN 266:1992 Specification for Textile wallcoverings.

[43] BS 3046:1981 Specification for Adhesives for hanging flexible wallcoverings.

[44] BS EN 13300:2001 Paints and varnishes – water-borne coating materials and coating systems for interior walls and ceilings – Classification.

[45] Directive 2004/42/CE of the European Parliament and of the Council of 21 April 2004 on the limitation of emission of volatile organic compounds due to the use of organic solvents in certain paints and varnishes and vehicle refinishing products and amending Directive 1999/13/EC. Official Journal of the European Union L.143/87, 30.4.2004.

[46] BS EN 717-1:2004 Wood-based panels Determination of formaldehyde release. Formaldehyde emission by the chamber method.

[47] BS EN 13999-2:2007. Part 2: Determination of volatile organic compounds.

[48] BS EN 13999-2:2007. Part 3: *Determination of volatile aldehydes*.

[49] BS EN 13999-2:2007. Part 4: *Determination of volatile diisocyanates*.

[50] BS EN 12149:1997 Wallcoverings in roll form – Determination of migration of heavy metals and certain other elements, of vinyl chloride monomer and of formaldehyde release.

[51] BS EN ISO 11890-2:2006 Paints and varnishes. *Determination of volatile organic compound (VOC) content. Gas-chromatographic method.*

[52] BRE Digest 464 VOC Emissions from Building Products - Part 1: "*Sources, testing and emission data*", Chuck Yu, Derrick Crump, CRC Ltd, 2002

[53] CIBSE Applications Manual AM11 *Building energy and environmental modelling*, CIBSE, 1998.

[54] CIBSE Guide A *Environmental Design*, 7th Edition, Issue 2, CIBSE, 2007.

[55] Legionnaires' disease - The control of legionella bacteria in water systems. Approved Code of Practice and guidance, 3rd ed. HSE, 2000.

[56] TM13 'Minimising the risk of Legionnaires disease', CIBSE, 2002.

[57] Building Bulletin 93 Acoustic design of schools – A design guide', DCFS.

[58] Health Technical Memorandum 08-01: *Acoustics*, Department of Health Gateway Review, Estates & Facilities Division, 2008.

[59] BS8233 Sound insulation and noise reduction for buildings - code of practice, BSI, 1999

[60] BS EN ISO 140-18:2006 *Acoustics. Measurement of sound insulation in buildings and of building elements. Laboratory measurement of sound generated by rainfall on building elements,* 2006.

[61] BS 7989 *Specification for recirculatory filtration fume upboards*, BSI, 2003.

[62] *Balancing the needs for energy conservation with those of building conservation: an Interim Guidance Note on the application of Part L*, English Heritage, 2004.

[63] *Thermal insulation: avoiding risks*, C Stirling, BRE Press, 2002.

[64] TM39 *Building Energy Metering*, CIBSE, 2009.

[65] GIL065 Metering and Energy Use in New Non-Domestic Buildings - A Guide to help designers meet Part L2 of the Building Regulations, Carbon Trust, 2002.

[66] General Information Leaflet 65, *Metering energy use in new non-domestic buildings,* BRECSU, 2002.

[67] BS 5489 Part 1 Code of practice for the design of road lighting: lighting of roads and public amenity areas, BSI, 2003.

[68] Quality Assurance for Combined Heat and Power: http://www.chpqa.com/

[69] Sustainable Bioenergy: a framework for decision makers, United Nations – Energy, 2007.

[70] BS EN 13187 Thermal performance of buildings, Qualitative detection of thermal irregularities in building envelopes. Infrared method, BSI, 1999.

[71] TM23:2000 Testing Buildings for Air Leakage, CIBSE, 2000.

[72] Guide B2 Ventilation and air conditioning, CIBSE, 2001.

[73] *TM46 Energy Benchmarks*. CIBSE, 2008.

[74] EU Code of Conduct on Data Centres:
http://re.jrc.ec.europa.eu/energyefficiency/html/standby_initiative_data%20centers.htm

[75] *Metric handbook – planning and design data*, Adler, Architectural Press 3rd Ed. 2007.

[76] BS5489-1:2003 *Lighting of roads and public amenity areas*, BSI.

[77] The National Cycle Network, *Guidelines and Practical Details issue 2*, Sustrans, 1997.
www.sustrans.org.uk/default.asp?sID=1149001882109

[78] http://www.sustrans.org.uk/webfiles/guidelines/appendix.pdf

[79] LTN 2/04 *Adjacent and Shared Use Facilities for Pedestrians and Cyclists*, DfT, 2005.
www.dft.gov.uk/consultations/archive/2004/ltnwc/ltn204adjacentandsharedusefa1692?page=1

[80] Water Supply (Water Fittings) Regulations, DEFRA, 1999.

[81] Rainwater and Greywater Use in Building, Best Practice Guidance, CIRIA, 2001.

[82] www.cites.org/

[83] BES6001:2008 Issue 1 *Framework Standard for the Responsible Sourcing of Construction Products*, BRE Global, 2008.

[84] UK Government Timber Procurement Policy, *Definition of 'legal' and 'sustainable' for timber procurement,* Second Edition, CPET, 2006.

[85] BS 5234-2: Partitions (including matching linings) – Specification for performance criteria for strength and robustness including methods of test, BSI1992.

[86] *A Report on the Demolition Protocol*, commissioned by London Remade prepared by EnviroCentre Ltd.
www.ice.org.uk

[87] Planning Policy Guidance (PPG) 3: *Housing*. www.planningportal.gov.uk.
Scottish Planning Policy Guidance (SPPG) 3: *Housing*. www.scotland.gov.uk/

[88] Data from the Countryside Survey can be accessed through the Digest of Environmental Statistics:
http://www.defra.gov.uk/environment/statistics/wildlife/wdcs.htm
http://www.countrysidesurvey.org.uk/archiveCS2000/

[89] UK BAP: www.ukbap.org.uk

[90] Thermal Guidelines for Data Processing Environments, ASHRAE, 2004.

[91] BS EN 378:2008 *Refrigerating systems and heat pumps. Safety and environmental requirements*, BSI.

[92] *Carbon Dioxide as a Refrigeration Code of Practice*, Institute of Refrigeration, 2009.

[93] *Ammonia Refrigeration Systems Code of Practice*, Institute of Refrigeration, 2009.

[94] Interim Code of Practice for Sustainable Drainage Systems (SUDS), CIRIA, 2004.

[95] C624 Development and flood risk, guidance for the construction industry, Lancaster et. al, CIRIA, 2004.

[96] Planning Policy Statement 25: *Development and Flood Risk*, CLG , 2006.

[97] BS EN 752-4: 2008, *Drain and sewer systems outside buildings*, British Standard Institute, 2008.

[98] BS EN 12056-3: 2000, Gravity drainage inside buildings – Part 3: Roof drainage, layout and calculation, British Standard Institute, 2000.

[99] Pollution Prevention Guideline (PPG) 3 *Use and design of oil separators in surface water drainage systems*, Environment Agency/SEPA/Environment & Heritage Service, 2006.
www.environment-agency.gov.uk/business/topics/pollution/39083.aspx

[100] C697 *The SUDS Manual*, CIRIA 2007.

[101] GN01 *Guidance notes for the reduction of obtrusive light*, Institution of Lighting Engineers (ILE), 2005.
www.ile.org.uk

[102] Technical Report No. 5: *The Brightness of Illuminated Advertisements*, Institution of Lighting Engineers (ILE), Third Ed, 2001.

[103] Guidance Note Controlling Light Pollution and Reducing Lighting Energy Consumption, Scottish Executive, 2007.

[104] BS4142 *Method for Rating industrial noise affecting mixed residential and industrial areas*, British Standards Institute, 1997.