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TECHNICAL MANUAL

BREEAM Refurbishment

Commercial | Version 7



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SD6075
BREEAM Refurbishment
Commercial
Version 7.0.0

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Acknowledgements

This manual has been made possible through the continued efforts of many dedicated BRE Group staff members, National Scheme Operators (NSOs), Technical Working Group members, BREEAM Assessors, customers and those who have responded to our consultation calls and meetings or provided feedback in other ways. BRE Global also extends its gratitude to those who support BREEAM by continuing to specify and apply the method and contribute towards a sustainable built environment.

Cover image

Space House, London, UK

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BRE Global Ltd (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.

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About this document

This document is the technical manual for BREEAM Refurbishment Version 7. It describes an environmental performance standard against which refurbishment projects can be assessed and achieve a BREEAM rating.

The scheme document and the information detailed within is intended for use by trained, qualified and licensed BREEAM Assessors in accordance with the procedural and operational requirements of BREEAM (as described in the BREEAM Operations Manual, SD5070) under the terms and conditions of a BREEAM licence. This document should be used by non-BREEAM Assessors for reference purposes only.

Changes to this document

This document is subject to revision and can be reissued from time-to-time by BRE Global. A schedule of the publication date for each issue is provided below.

Document reference	Version / issue number	Issue date
SD6075	7.0.0	15/07/2026

Introduction

About BREEAM

BREEAM is the world's first and leading holistic framework for assessing asset sustainability performance in the global built environment. It is driven by a mission to enable projects of any size to protect and enhance asset value on the way towards a healthy and resilient future in the built environment.

Launched in 1990 and applied in more than 100 countries, BREEAM has certified more than a million assessments from infrastructure, through building design, to existing assets.

How BREEAM drives asset value

Defined by science and informed by the global real estate and construction industry, BREEAM standards reflect and drive market shifts by encouraging data-driven strategies that deliver quantifiable environmental, social and economic performance. By using a holistic and flexible approach that encourages positive outcomes, BREEAM delivers a tailored roadmap to drive asset value from a financial, environmental, performance, risk, health, and social perspective.

BREEAM has provided robust and credible third-party certification for over three decades, delivering sustainability performance transparency across every phase of the built environment, from new builds to operations, refurbishments, and fit outs.

BREEAM certification involves a rigorous assessment process that recognises and reflects the value in higher performing assets and encourages excellence. BREEAM certification provides a proven value-generation tool to deliver sustainability performance, manage sustainability risk, enhance marketability and provide validation of sustainability performance claims.

The BREEAM schemes

BREEAM schemes are based on an international version that is applicable in any country that doesn't have a country-specific scheme, and are operated by BRE Global. In some countries, BREEAM schemes are adapted to the local market while maintaining the BREEAM rigour. These are typically operated by National Scheme Operators (NSOs).

Each scheme assesses the environmental performance at each stage in the life cycle including:

- **BREEAM Communities** for the master-planning of a larger community of buildings.
- **BREEAM Infrastructure** for civil engineering, infrastructure, landscaping and public realm works.
- **BREEAM New Construction** for new-build domestic and non-domestic buildings.
- **BREEAM New Construction Residential** for new-build dwellings (in the UK only).
- **BREEAM In-Use** for existing buildings in operation.
- **BREEAM Refurbishment** for non-domestic building fit-outs and refurbishments.
- **BREEAM Fit Out** for non-domestic fit out projects.

The BREEAM certification process

BREEAM certification requires an asset to demonstrate how it performs against the standard appropriate for the relevant life cycle phase.

Independent BREEAM assessors – who are trained, qualified, and licensed by the organisation operating the applicable BREEAM scheme – can carry out a BREEAM assessment using the relevant scheme document and associated scoring and reporting tools. The assessor independently verifies performance of the asset against the applicable BREEAM standard and awards the score and associated rating.

The assessor submits their assessment to the organisation operating the applicable BREEAM scheme where it undergoes a rigorous quality assurance process. Only once the assessment has passed this process will the organisation operating the applicable BREEAM programme issue a BREEAM certificate. The BREEAM certificate provides formal verification that the assessor has assessed the building in accordance with the requirements of the scheme and its quality standards and procedures. For more information, please visit the BREEAM website (www.breeam.com).

A BREEAM certificate provides assurance that a building's BREEAM rating, at the time of certification, accurately reflects its performance against the BREEAM standard.

Interested parties can verify the BREEAM rating of a building by searching the BREEAM buildings listings on BREEAM Projects (www.breeam.com/projects).



SAMPLE

Figure 1: The BREEAM certification mark

National Scheme Operators (NSOs)

National Scheme Operators (NSOs) operate tailored, country-specific BREEAM schemes under licence from BRE Global. These organisations are selected to provide local knowledge, market presence and local stakeholder engagement through their governance structures.

The schemes developed by NSOs must comply with the requirements of the BREEAM Product Structure and the BREEAM NSO Process Manual to ensure high-level consistency across the development and operation of BREEAM schemes.

Local schemes must be used for assessments where they have been developed.

To understand which countries require the use of a local scheme, and the NSO which operates the scheme, please see Scope of BREEAM Refurbishment on page 19.

Where a building falls outside of the scope of the NSO local schemes, or there is no local NSO operating in a country, the pan-country BREEAM International schemes (such as this one) are used. These are operated by BRE Global, who is also the NSO for BREEAM UK and BREEAM USA.

Ensuring quality and consistency

All BREEAM schemes are developed and operated by National Scheme Operators (NSOs) in accordance with the BREEAM Process Manual and Product Structure. These documents ensure that a common scientific and performance basis is used by all compliant schemes operated by NSOs, while ensuring that these are relevant to local demands, standards and practices.

To ensure competence, impartiality, and performance capability, all NSOs are required to maintain scheme operations to internationally agreed standards and seek accreditation from a national accreditation body.

BRE Global is certified to ISO 9001:2015 Quality management systems, the scope of which covers the operation of all BREEAM schemes. BRE Global maintains an impartiality committee to safeguard impartiality in the development and operation of BREEAM schemes.

BRE Global operates technical working groups, providing access to experts who can review BRE Global's standards and BREEAM schemes. These technical working groups ensure BREEAM's robustness from a scientific, technical and market perspective as well as ensuring the development of the standards and schemes is open to greater external and independent scrutiny.

BREEAM is a building level certification scheme and as such, there are no "BREEAM certified" products. BREEAM provides credits where the process, and in some cases the performance, meet a specific standard. It does not recognise specific products as "BREEAM compliant".

Value of data collection

The journey to obtaining a BREEAM rating begins with collecting quality data to measure, verify and understand the environmental impact of buildings. Effective data collection helps to:

- Verify that buildings meet the requirements for the certification standard.
- Inform business decisions that may impact sustainability risk and asset value.
- Demonstrate compliance with technical screening criteria in sustainable finance taxonomies being developed in multiple jurisdictions like the EU Taxonomy.
- Compare performance against other buildings in the sector.
- Set industry standards and encourage competition towards higher sustainability goals.
- Ensure transparency in the certification process.

Sustainable finance and alignment with the EU Taxonomy

The 2015 Paris Agreement set out the global commitment to act on climate change and transition to a low-carbon economy. Sustainable finance has a key role to play in realising this commitment. It generally refers to the process of taking due account of environmental and social considerations in investment decision-making, leading to increased investments in longer-term and sustainable activities. One of the essential elements of this process is around developing a universal definition for sustainable investment – a common language for investors, regulators, and other stakeholders. Sustainable finance taxonomies, which codify this common language, have been introduced or are in various stages of development in more than 20 jurisdictions worldwide.(1) Even jurisdictions that lack a local taxonomy are being influenced by those already in place as investors bring their expectations and requirements to assets they own or invest in across the world.

One highly influential taxonomy is the EU's Sustainable Finance Taxonomy. This science-based taxonomy is framed around six environmental objectives and forms part of the European Green Deal which aims to transform the European Union and the wider European economy into a sustainable and climate-neutral society by 2050. Large companies, banks and insurance companies operating in the EU, as well as companies with securities listed on EU-regulated markets (with exception of listed micro-enterprises) need to demonstrate that their economic activities make a substantial contribution towards achieving one of the six objectives, while doing no significant harm to the other five. This is achieved by complying with technical screening criteria and minimum safeguards.

BREEAM standards provide a solution for real estate funds, asset owners, developers, and occupiers who look for a truly independent mark to validate their sustainability achievements and navigate the pathway towards decarbonisation, net zero, EU Taxonomy compliance, and future asset resilience. Most technical screening criteria for construction and real estate activities in the EU Taxonomy are embedded in BREEAM V7. A BREEAM assessment provides an asset-level EU Taxonomy report, which shows the level of alignment with those technical screening criteria. The report gives companies and stakeholders in financial markets assurance of the extent to which the asset meets the requirements of the EU Taxonomy. The report should be used for guidance purposes only and does not guarantee that all Taxonomy requirements have been met.

Full alignment maps are available online at:
breeam.com/about/disclosures-and-reporting/breeam-eu-taxonomy

These provide an overview of issues and criteria where BREEAM fully aligns with the EU Taxonomy.

Minimum safeguards include criteria about the governance of a company or entity. As BREEAM measures sustainability in buildings and not companies, minimum safeguards are not included.

The EU Taxonomy is in continuous development and is subject to the addition of new activities and updates, as necessary. BREEAM's alignment with the EU Taxonomy is based on our interpretation of the Climate Delegated Act (Commission Delegated Regulation (EU) 2021/2139 and 2023/2485) and Environmental Delegated Act (Commission Delegated Regulation (EU) 2023/2486). BREEAM will endeavour to update the alignment whenever new content is formally added to an Annex including any changes to the criteria or in the interpretation of the technical screening criteria.

As these global taxonomies evolve, BREEAM will continue to monitor and ensure that the data captured as part of BREEAM assessments supports reporting to sustainable finance taxonomy criteria.

When and how to engage with BREEAM Refurbishment

Early engagement with the BREEAM Refurbishment scheme and appointment of a licensed BREEAM Assessor is important to optimize sustainability performance of refurbishments and ensure the requirements are delivered during renovations. At this early stage, the performance of the building and the desired BREEAM rating can be achieved in the most cost-effective way while there is greater flexibility and choice in design solutions and spending decisions.

Up-to-date listings of licensed BREEAM Assessors and credentialed BREEAM Advisory Professionals are available on BREEAM Projects (www.breeam.com/projects).

BREEAM primarily reflects the overall performance of the building rather than just the opportunities or limitations placed on specific stakeholders involved in the process. This means that the client, design team, principal contractor, as well as other specialist disciplines, have an important role to play throughout the renovation process, if the desired performance level is to be achieved and reflected through the certified BREEAM rating. The assessor verifies the impact of renovation decisions to the score and rating as the project progresses, ensuring that the implications of decisions made are understood by all parties.

Aligning the brief to meet the BREEAM requirements for the rating desired will simplify the assessment process and reduce risk. Clients and their project teams are encouraged to engage with a licensed BREEAM Assessor and BREEAM Advisory Professional no later than the Preparation and Brief stage (RIBA Stage 1 or equivalent). This will ensure that realistic targets are set and can be met, appropriate responsibilities can be defined and understood, and low or no cost solutions which deliver the most holistic sustainability benefits can be sought and applied wherever possible.

About this technical manual

This BREEAM technical manual has been created to:

1. Enable qualified and licensed BREEAM Assessors to complete BREEAM assessments and determine a rating.
2. Enable BRE Global to complete quality assurance reviews of a BREEAM Assessor's assessment, in accordance with the standards to which BRE Global is accredited.
3. Act as an aid for BREEAM Advisory Professionals (AP) to undertake project team facilitation, in terms of defining, monitoring and successfully achieving the desired BREEAM rating.
4. Act as a reference for clients and members of the project team whose proposed building is being BREEAM-assessed.

How to use this technical manual

This technical manual sets out the essential and in-depth requirements for this BREEAM scheme.

The technical manual is divided into the following sections:

1. Introduction
2. Scope
3. Scoring and rating, including minimum standards
4. Evidence requirements
5. Assessment issues, arranged in categories
6. Appendices
7. Checklists

The **scope** section describes the types of buildings and stages of assessment that this version of BREEAM can be applied to. The scope section can be used by clients and BREEAM Assessors to check whether this is the correct BREEAM scheme to use for a project.

The **scoring and rating** section illustrates how a building's assessed performance is measured and rated. It outlines the rating level benchmarks, the minimum standards for each rating level, and the category weightings. It also includes a description of the BREEAM assessment issues and credits awarded for the performance achieved (both standard and for innovation) and how the credits are used to calculate the score and the BREEAM rating.

The **evidence requirements** section provides guidance to assessors and project teams on the various types and forms of evidence required by the BREEAM Assessor to verify compliance with assessment criteria. This includes a description of why BREEAM requires an auditable trail of evidence.

The **assessment issues** section includes the individual BREEAM assessment issues, arranged in categories. Each issue defines a level of performance (the assessment criteria) against which the assessed building demonstrates compliance by providing evidence in order to achieve a corresponding number of available BREEAM credits.

While clients and their project team can pick and choose which issues to target in order to build their BREEAM performance score and achieve the desired BREEAM rating, the categories are weighted in the scoring methodology to encourage focus on performance that has the greatest impact to the overall sustainability performance of the asset. Minimum standards of performance are linked to some BREEAM ratings, ensuring that specific credits or criteria must be achieved in order to achieve those ratings. BREEAM's minimum standards are outlined in the Scoring and rating section. Clients and their project team should review these carefully when selecting a rating target.

The **appendices** and **checklists** provide supporting information for completing a BREEAM assessment.

Assessment issue structure

Each assessment issue is structured as follows:

1. **Issue title**: the assessment issue reference and title.
2. **Aim**: the objective of the issue and the impact it measures or mitigates.
3. **Overview**: the number of credits available for each assessment type and whether the issue forms part of the BREEAM minimum standards. For some assessment issues the number of credits available can also vary by building type. Assessment type and building type specific information is given in:
    a. **Assessment type specific notes**: information that affects specific assessment types (such as 'Part 1').
    b. **Building type specific notes**: information that affects the assessment of specific building types (such as 'Industrial' or 'Hotels').
    c. **Issue specific notes:** information that affects the applicability of an issue based on the features present in a particular asset (such as no water fittings being present).
4. **Assessment criteria**: the good and best practice performance level benchmarks and criteria. Where the building complies with the assessment criteria, as determined by the BREEAM Assessor, the relevant number of BREEAM credits can be awarded. Some issues have exemplary level criteria; where a building demonstrates that it meets exemplary level criteria, a BREEAM innovation credit can be awarded (for more details, refer to Inn 01 Innovation on page 453). Up to a maximum of 10 innovation credits are available.
5. **Methodology**: includes a description of any methodology used to determine the number of credits achieved for a given level of building performance. It includes, for example, calculation procedures or guidance on how to relate non-BREEAM schemes, standards or qualifications referenced to the assessment criteria.
6. **Compliance notes**: additional guidance that supports the application and interpretation of the main assessment criteria, including how to assess compliance in particular scenarios.
7. **Evidence**: describes the types of project information that the design team or client must provide to the licensed BREEAM Assessor to enable verification of the building's performance against the assessment criteria and justification of credits awarded.
8. **Definitions**: specific definitions of terms used in the assessment issue.

Some assessment issues also include:

9. **Checklists and tables**: a separate section for checklists or tables referenced in the assessment criteria. This can include tables of benchmarks or building type specific performance criteria. Some checklists are also included separately in a section after the appendices.
10. **Additional information**: further information relevant to the application of the assessment criteria, or sources of information that may be of use in addressing the issue.

Scope

Scope of BREEAM Refurbishment

BREEAM Refurbishment can be used to assess the environmental life cycle impacts of existing commercial buildings at the refurbishment stage, as well as projects involving the completion or fit out of shell-only buildings where building fabric, structure, core systems or overall operational performance are being installed or upgraded.

A modular set of criteria are applied depending upon the scope of works for a particular project type, including:

- Part 1: Fabric and structure
- Part 2: Core services
- Part 3: Local services
- Part 4: Interior design

The use of separate Parts allows the assessment to reflect the differing responsibilities of building owners and occupiers, as well as the varied life cycle stages of building elements. For example, interior finishes are typically replaced more frequently than core building elements such as structure or façade.

For commercial buildings, Parts 1 and 2 generally relate to elements under owner responsibility, while Parts 3 and 4 typically relate to occupier-controlled elements. This may vary depending on the specific project.

For more information on the scope of works included in different parts in BREEAM Refurbishment, see Assessment parts.

Scope of BREEAM Refurbishment and Fit Out

BREEAM Refurbishment and Fit Out V7 comprises two standards:

- BREEAM Refurbishment
- BREEAM Fit Out

These provide tailored pathways reflecting the differing responsibilities of building owners and occupiers and together enable the assessment of a wide range of projects, from whole-building refurbishments and system upgrades to interior-focused fit out works. The term “Refurbishment and Fit Out” is used as a collective descriptor for these standards.

When to use BREEAM Refurbishment or BREEAM Fit Out

BREEAM Refurbishment

BREEAM Refurbishment covers building upgrades that may include changes to the fabric, structure, core building systems and operational performance of an existing asset. It is typically used where work extends beyond individual spaces to improve the overall building’s performance and longevity. It is suitable for projects involving the major refurbishment or renovation of existing buildings, or the first-fit out of shell-only buildings.

The standard can be applied to projects covering any combination of Parts 1–4. However, it is not appropriate where the scope of works is limited solely to interior design (Part 4 only). In such cases, BREEAM Fit Out should be used.

BREEAM Fit Out

BREEAM Fit Out is designed for tenant-led or interior-focused projects where the wider building structure, fabric and core systems are not being significantly altered. It is suited to projects focused on the interior spaces within a building, including layouts, finishes, furnishings and localised services.

In scope terms the BREEAM Fit Out standard broadly aligns with the *Part 4: Interior design* elements of BREEAM Refurbishment, but can also include aspects comparable to *Part 3: Local services*.

Building location

BREEAM Refurbishment Commercial is applicable to existing buildings in all countries, except where a licensed BREEAM National Scheme Operator (NSO) offers a country-specific local scheme that is appropriate. Where a country has an NSO offering a country-specific local scheme that is appropriate, the NSO scheme must be used. Countries with local schemes are listed in Table 1 below.

Table 1: Local schemes operated by National Scheme Operators

Country	Scheme operator	Local scheme
The Netherlands	Dutch Green Building Council (DGBC)	BREEAM NL
Sweden	Sweden Green Building Council (SGBC)	BREEAM SE
Spain	Technological Institute of Galicia (ITG)	BREEAM ES

Building types

Asset categories which can be assessed and rated using BREEAM Refurbishment V7 are outlined in Table 2 below. A full list of asset types and sub-types can be found in Appendix A.

Table 2: List of building types covered under BREEAM Refurbishment V7

Asset category
Commercial laboratory
Community
Culture and entertainment
Education
Government services
Healthcare
Hospitality
Industrial
Office
Residential institution
Retail
Sports and leisure
Transport hub

Bespoke assessment

For building types that are not listed in Appendix A, BRE offers a bespoke assessment service.

This service involves the building undergoing a scoping and tailoring exercise, from which BRE Global will identify the appropriate criteria to apply to the building, to facilitate a bespoke assessment and rating. Further guidance on this 'bespoke' process can be found in Guidance Note 23.

Mixed-use developments and building types

BREEAM defines different criteria and benchmarks for some assessment issues according to building type, function and use. A single building that includes different functions areas, e.g. office and retail, can be assessed under a single BREEAM assessment. Each area will need to comply with the relevant criteria for the building type. BREEAM credits that are awarded based on performance scales, such as Ene 01, Ene 02, Wat 01 and Mat 01, will be calculated on an area weighted basis.

Buildings that are a mix of commercial and residential asset types, and developments that include separate buildings with different function types, will need separate BREEAM assessments.

Further guidance can be found in Guidance Note 20.

Part new-build, part refurbishment projects

For developments that include both new-build and refurbished areas, the choice of scheme depends on the scope of the new-build and refurbishment works.

Where the new build area is < 50% of the project gross internal area it can be assessed under BREEAM Refurbishment. When a new extension is included within a BREEAM Refurbishment assessment, the scope of works for the new-build element must align with the Parts selected for assessment, and the assessment must include Part 1.

Where the new build area is ≥ 50% of the project gross internal area a single BREEAM Refurbishment assessment is not appropriate and there are two options as described below.

Option 1: Separate BREEAM New Construction and BREEAM Refurbishment assessments

Under Option 1, two separate BREEAM assessments are conducted. A BREEAM New Construction assessment is undertaken on the new build area and a BREEAM Refurbishment assessment is undertaken on the existing building refurbishment or fit out. Two certificates and ratings will be issued to indicate the performance of the new build area and existing building refurbishment or fit out separately.

Option 2: BREEAM Bespoke assessment

Under Option 2, BRE Global produces a bespoke criteria appendix document that determines, for specific BREEAM issues, which issues and assessment criteria are applicable to a particular part new-build, part-refurbishment project. It refers to both the BREEAM Refurbishment manual and the BREEAM New Construction manual. A bespoke Scoring and Reporting tool is produced for the project.

As part of the bespoke criteria development for Ene 01 Energy and carbon performance for regulated energy uses the new-build area will be assessed against BREEAM New Construction criteria and the refurbishment area against the BREEAM Refurbishment criteria. The tool then performs an area-weighted average score.

Historic buildings

For the purpose of assessing historic buildings under BREEAM Refurbishment Commercial V7, historic buildings are defined as:

Buildings or monuments that are formally listed and protected under international, national or local laws or schedules and therefore subject to local planning and building regulations, including buildings that are in a conservation zone. Such buildings will normally require consent from the local, national or international historic buildings authority.

Examples of historic building authorities include:

- UNESCO
- Architectes des Bâtiments de France (ABF)
- The National Heritage Board of Poland
- Listed buildings – Grade I, Grade II* and Grade II (England and Wales), Grade A, B and C (Scotland) and A, B1 and B2 (Northern Ireland)

Historic buildings can also be designated as part of a broader context, for example:

- Existing buildings situated in conservation areas (where the existing building itself has conservation status and contributes to the status of the conservation area)
- 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
- Existing buildings designated as being of architectural and historic interest within national parks, areas of outstanding natural beauty, and world heritage sites.

Within this scheme document, there are a number of compliance notes that should be referred to where undertaking an assessment of a historic building.

Similar building types (or units) on the same site

It is possible to assess and rate a number of separate but similar non-residential buildings, or individual units within a larger building development, within one BREEAM assessment report. Further guidance on this type of assessment can be found in Guidance Note 20.

Assessment parts

BREEAM Refurbishment Commercial V7 has been developed to allow a flexible approach to assessments to fit the needs of a project. This approach allows the client/developer/assessor to select the Parts of the assessment that are relevant to the scope of work being carried out. For example, where installing local services and interior finishes to tenant areas only, a Part 3 and Part 4 assessment would be appropriate.

The following assessment scope provides details of when it may be appropriate to conduct an assessment against each Part, depending on the nature of the refurbishment or fit-out works that are being carried out.

It is important to ensure that the Parts selected align with the scope of works. In cases where the project is a mix of fit out levels or the scope falls somewhere between assessment types, it is generally recommended that you assess under the Parts common to all areas.

Where areas of a building are not being refurbished, or not refurbished to the same level, they can be omitted from the assessment. However, the project details should clearly highlight the areas of the building that have been assessed.

Where only limited elements within the scope of a selected Part are being installed or upgraded, it may not be appropriate to include that Part within the assessment. This can apply to projects with partial upgrades, speculative developments, where a full tenant (Cat B) fit out is not being delivered, or where the scope does not fully align with the intent of the Part. In such cases, a pre-assessment review of all available credits should be undertaken to determine whether including the Part is appropriate for the project scope. Where only limited changes are proposed, this may constrain the number of credits that can be achieved.

Part 1: Fabric and structure

Summary

This will include works to the external envelope and building structure.

When to complete

A Part 1 assessment may be appropriate where the area of external envelope to be renovated is either:

- Greater than 50% of the surface of the individual element (roof, wall, windows) OR
- Equates to 25% of the total building envelope.

Examples of alterations to the building fabric would include:

- **Building façade:** where the external façade of the buildings is being upgraded or replaced such as new cladding or façade system, upgrading the thermal insulation or installing new internal dry lining.
- **Roof:** where a new roof is being installed or where significant changes are being made to the roof structure or the replacement/refurbishment of existing roof coverings.
- **Windows:** where changes are being made to the windows such as replacement, upgrade/refurbishment of existing windows with new glazing or the specification of secondary glazing.

Notes

A minor change to the building fabric (e.g. local upgrading of an external wall) below the above thresholds would not warrant a Part 1 assessment, although it may be carried out in order to assess the overall performance of the building fabric.

Part 2: Core services

Summary

This will include the installation or upgrade of core building services and fit-out of common building areas.

When to complete

A Part 2 assessment may be appropriate where at least two of the following core building systems are being installed or upgraded to a level that requires compliance with national building regulations:

- Central air handling unit
- Heating boiler

- More than 50% of heat distribution
- Chiller plant
- More than 50% of chiller distribution
- Water services including sanitary fittings in core areas
- Building management system
- Community heating system
- Low and zero carbon technologies.

It may also include installation or refurbishment of the following, where applicable, **to core areas only**:

- Electrical services such as lighting, power, fire and security
- Transportation systems such as lifts
- Internal partitions
- Internal finishes to floors, walls and ceilings
- Fixtures and fittings including welfare facilities within common areas

Notes

A Part 2 assessment may not be appropriate where works only comprise of 'like for like' component replacements rather than changes or upgrading of the building services systems, such as replacing the fan motor of an air handling unit. It may still however be carried out in order to assess the performance of the core services.

Definition of core services

Core services are defined as services that supply multiple areas and/or tenants and will generally be centralised plant.

- The services will be deemed core where the services supply multiple tenancy areas and are not focused on the needs of the individual tenants. In such instances these services will normally be owned, operated and maintained by the landlord or their agent.
- In single tenancy occupancy buildings, the systems services will be considered as core where they supply the whole of the building. The services will normally be owned, operated and maintained by the building owner or their agent.

Part 3: Local services

Summary

This includes the full fit-out of building services to tenanted or main function/net internal areas of the building.

When to complete

A Part 3 assessment may be appropriate where at least two of the following fixed local building services are being installed or upgraded:

- Replacement of more than 50% of light fittings, system and controls
- Upgrade of zone controls
- Local ventilation
- Local heating units (including sources not connected to core services)
- Local cooling units (including sources not connected to core services)
- Point of use water heaters.
- Local electrical installations such as sub-metering.

Notes

If there is a requirement to replace a component of a local service as part of the refurbishment or fit-out and that component is a direct replacement, then a Part 3 assessment may not be appropriate. A Part 3 assessment may still however be carried out in order to assess the performance of local services. Examples of component replacements could include new lamps within existing fittings, circulation pumps or individual heat emitters and valves.

Definition of local services

Local services are defined as services that supply a specific area and may connect into the distribution systems from the core services within the tenanted area.

Part 4: Interior design

Summary

This covers the full fit-out of the interior spaces and finishes to tenanted or main function/net internal floor areas of the building.

When to complete

It may be appropriate to include Part 4 when the works involve at least two of the remodelling or changes listed below to the interior layout and redecoration of the refurbishment or fit-out areas:

- Wall finishes
- Floor coverings
- Ceiling finishes
- Partitions
- Raised floor system
- Furniture and fittings, e.g. office furniture, retail display furniture and fittings etc.
- Sanitary fittings, e.g. tea or coffee points, kitchenette and washrooms within tenanted areas.
- Equipment, e.g. office equipment, display lighting, display chillers or freezers.

Notes

A Part 4 only assessment cannot be completed using BREEAM Refurbishment. Where the scope of works is limited to Part 4 related works, the appropriate standard is BREEAM Fit Out.

For UK projects: Alignment with a Category A or Category B fit out

Part 2 assessments

A Part 2 assessment does not include the full scope of a typical Cat A fit out, due to the fact that the specification of items such as ceiling finishes, raised floors and the zoning of local services above the lettable floor area and other Category A works are not typically finalised until the space undergoes final fit-out according to the tenant's specification, and as such are liable to change.

Part 3 assessments

The installation of local services under a Part 3 assessment would generally cover the typical scope of a Category A fit out, however the scope of this varies between different developers. Therefore, it is important to review the actual scope of works for the project against the applicable credits to determine if this covers all the criteria requirements and how this impacts the overall BREEAM rating and score. Unless there is specific guidance or filtering within an issue for speculative projects, all applicable criteria must be implemented in order to achieve credits and cannot be awarded on the basis of future fit-out specifications or contractual documents.

Part 4 assessments

Local services and interior finishes under a Part 3 and 4 assessment would typically cover the typical scope of a Category A and B fit out. Including a Part 4 assessment may not be appropriate where the scope of works does not include a full Cat B fit out or the project is speculative. Where only a Category A fit out is proposed, we recommend that a pre-assessment review of all available credits is undertaken to determine if a Part 4 assessment is appropriate for the scope of works.

Assessment stages

BREEAM Refurbishment can be used to assess and rate the environmental impacts arising from a building refurbishment (including external site areas) at the following project stages:

1. Design stage (DS) (optional) – leading to an interim BREEAM rating and certificate of assessment.
2. Post-construction stage (PCS) – leading to a final BREEAM rating and certificate of assessment.

Design stage

The design stage (DS) assessment and interim BREEAM rating is optional and can be used to demonstrate the proposed building's performance at the design stage of the life cycle. It is strongly recommended that assessment and certification should occur prior to the beginning of operations on site. The BREEAM rating at this stage is labelled as 'interim' because it does not represent the building's final BREEAM performance.

To complete an assessment at this stage, the design must be advanced to a point where the relevant design information is available to enable the BREEAM Assessor to evaluate and verify the building's performance against the criteria defined in this scheme document. The interim DS assessment will therefore be completed and certified at the scheme design or detailed design stages.

Post-construction stage

The post-construction stage (PCS) assessment and BREEAM rating is a mandatory certification stage that can be used to demonstrate the final 'as-built' performance of the building. 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 (PCR), based on a completed interim design stage assessment
2. A standalone post-construction assessment (PCA).

A PCR serves to confirm the assessment of a building's 'as-built' performance and rating and where appropriate that it is in accordance with the assessment certified at the interim design stage. Where an interim DS assessment has not been carried out and a BREEAM assessment and rating is required, a full post-construction stage assessment can be conducted.

Building life cycle stages not covered

BREEAM Refurbishment is not designed to assess the environmental impacts of:

- Newly constructed buildings (see BREEAM New Construction)
- Existing buildings in operation or existing unoccupied buildings (see BREEAM In-Use)
- Masterplanning projects (see BREEAM Communities)
- Infrastructure projects (see BREEAM Infrastructure)
- Interior design fit out projects (see BREEAM Fit Out)

Scoring and rating

Rating benchmarks

There are a number of elements that determine the overall performance of a project assessed using BREEAM:

1. The scope of the assessment
2. The BREEAM rating level benchmarks
3. The minimum BREEAM standards
4. The category weightings
5. The BREEAM assessment issues and credits

How these elements combine to produce a BREEAM rating for a project is summarised in the following sections. This is followed by a description and example describing the methodology for calculating a rating.

The BREEAM rating benchmarks for projects assessed using BREEAM RefurbishmentV7 are shown in Table 3 below.

Table 3: BREEAM rating benchmarks

BREEAM rating	Overall score
Outstanding	≥ 85%
Excellent	≥ 70%
Very Good	≥ 55%
Good	≥ 40%
Pass	≥ 25%
Unclassified	< 25%

The BREEAM rating benchmarks enable a client and all other stakeholders to compare the performance of a building with other BREEAM rated buildings of the same type, and the typical sustainability performance of a stock of buildings.

In this respect each BREEAM rating broadly represents performance equivalent to:

1. Outstanding: Less than the top 1% of buildings (innovator)
2. Excellent: Top 10% of buildings (best practice)
3. Very Good: Top 25% of buildings (advanced good practice)
4. Good: Top 50% of buildings (intermediate good practice)
5. Pass: Top 75% of buildings (standard good practice)

An unclassified BREEAM rating represents performance that is non-compliant with BREEAM, in terms of failing to meet either the BREEAM minimum standards of performance for key environmental issues or the overall threshold score required to achieve at least a Pass rating.

Minimum standards

To maintain a flexible system BREEAM adopts a 'balanced scorecard' approach to the assessment and rating of a project. This means that to achieve a particular level of performance the majority of BREEAM credits can be traded, i.e. non-compliance in one area can be offset through compliance in another to achieve the target BREEAM rating.

However, to ensure that performance against fundamental environmental issues is not overlooked in pursuit of a particular rating, BREEAM sets minimum standards of performance in key areas, e.g. energy, water, waste etc. It is important to bear in mind that these are minimum acceptable levels of performance and in that respect they should not necessarily be viewed as levels that are representative of best practice for a BREEAM rating level.

To achieve a particular BREEAM rating, the minimum overall percentage score must be achieved and the minimum standards, detailed in Table 4 below, applicable to that rating level complied with.

Table 4: Minimum BREEAM standards by rating level

BREEAM issue	Minimum standards by BREEAM rating level				
	Pass	Good	Very Good	Excellent	Outstanding
Man 03 Responsible construction	**National health and safety legislation is met** Criterion 2			**Basic responsible construction practices** One credit (Responsible construction management)	**Advanced responsible construction practices** Two credits (Responsible construction management)
Man 04 Commissioning and handover			**Commissioning of building systems** One credit (Schedule and responsibilities) **Technical and non-technical building user guide written** Criterion 11 (Handover)		
Man 05 Aftercare				**Commitment to 12 month in-use commissioning** One credit (In-use commissioning)	
Hea 04 Indoor air quality	**No asbestos used** Criterion 1		**Indoor air quality plan** Criterion 2 **Smoking ban** Criterion 7		
Ene 01 Energy and carbon performance for regulated energy uses / Ene 02 Prediction of operational energy and carbon				**Calculated energy performance improvement** 42% of available credits achieved, Ene 01 OR Three credits (Predicted operational energy performance score, criteria 8–9), Ene 02 OR	**Calculated energy performance improvement** 67% of available credits achieved, Ene 01 OR Five credits (Predicted operational energy performance score, criteria 8–9), Ene 02 OR

BREEAM issue	Minimum standards by BREEAM rating level				
	Pass	Good	Very Good	Excellent	Outstanding
				For Part 1 only assessments, see note 1.	For Part 1 only assessments, see note 1.
Ene 02 Prediction of operational energy and carbon					**Prediction of operational energy consumption** Three credits (Prediction of operational energy consumption, criteria 2–5) **No fossil fuel use by in-scope building services and equipment** Criterion 19
Ene 03 Energy monitoring			**Monitoring for 90% energy consumption by end use** One credit (Energy monitoring by end-use)		
Wat 01 Water consumption		**15% improvement over baseline** One credit			**30% improvement over baseline** Two credits
Wat 02 Water monitoring		**A water meter is installed (Part 2 only)** Criterion 1			
Mat 01 Building life cycle assessment				**Any project stage LCA and embodied carbon reporting** Criteria 1–6	**All project stage LCA and embodied carbon reporting** Five credits (Criteria 1–6)
Mat 03 Responsible sourcing of construction products	**Legally harvested and traded timber** Criterion 1				
Wst 01 Construction waste management					**Pre-refurbishment audit** One credit OR **Resource management plan** One credit (Construction resource efficiency)
Wst 03 Operational waste				**Recycling facilities provided** One credit	

BREEAM issue	Minimum standards by BREEAM rating level				
	Pass	Good	Very Good	Excellent	Outstanding
Pol 01 Impact of refrigerants					**No refrigerant use** Three credits (No refrigerant use) OR **Refrigerants have an emissions rate < 1000 kgCO_2e per kW** One credit (Impact of refrigerant)

Notes to Table 4

1. Part 1 only assessments may alternatively achieve the fabric performance optimisation approach specified in criterion 7 in Ene 04.

Category weightings

Category weightings provide a means of defining, and therefore ranking, the relative impact of environmental categories.

An example of the category weightings for BREEAM Refurbishment V7 are displayed in Table 5.

The weightings used for BREEAM Refurbishment assessments are based on the specific credits available compared to the maximum available for the category. Therefore, the weightings applied within the BREEAM Platform depends on the scope of the assessment: the applicable assessment parts and any 'scope dependent' issues or credits.

For example, where undertaking an assessment where the land use and ecology category is not within scope, then the weighting for land use and ecology will be zero and the weighting for other categories will be adjusted to take account of this on a proportionate basis. This means the weightings displayed and applied to an assessment in the BREEAM Platform may differ significantly from the example weightings given in Table 5 below.

Table 5: Example category weightings for BREEAM Refurbishment V7 (Italy)

Category	Core weightings		Example A (Parts 1–4, with extension and Lue in-scope)		Example B (Parts 1–2, no extension and Lue not in-scope)	
	Credits available	Category weighting	Credits available	Category weighting	Credits available	Category weighting
Management	21	11.00%	21	11.06%	21	13.15%
Health and wellbeing	24	14.25%	24	14.33%	14	9.94%
Energy	48	13.25%	48	13.32%	48	15.84%
Transport	10	8.50%	10	8.55%	10	10.16%
Water	12	8.50%	12	8.55%	12	10.16%
Materials	13	12.00%	13	12.07%	11	12.14%
Resilience	16	16.50%	16	16.59%	16	19.72%
Waste	9	5.00%	8	4.47%	8	5.31%
Land use and ecology	11	8.00%	11	8.04%	0	0.00%
Pollution	9	3.00%	9	3.02%	9	3.58%
Total	173	100.00%	172	100.00%	149	100.00%
Innovation (additional)	10	10.00%	10	10.00%	10	10.00%

Each category in BREEAM consists of a differing number of assessment issues and credits (as defined in the technical sections of this document).

The weightings given in Table 5 above are an example of the weightings for BREEAM Refurbishment assessments. The actual weightings used in an assessment will vary based on the applicable assessment parts and the specific assessment issues and credits that are in scope.

Adaptation of weightings for local conditions

The weightings are adapted for local conditions, this is done for the first project that registers for assessment in a new country or region. The weightings are set for that project and all other projects thereafter in that country or region for the life of that BREEAM Refurbishment version. The development of these weightings is based on robust and independent information provided by 'local experts' who have an understanding of local conditions. This may be a member of the design team, if they can demonstrate sufficient knowledge of the environmental conditions of the region or country, or another individual or organisation with the relevant expertise.

The BREEAM Assessor completes the 'BREEAM International V7 Weightings Questionnaire' (available from BREEAM Projects) and submits it to BRE Global, who use the information to set appropriate weightings for that country or region.

The weightings are tailored based on the technical categories, with categories being considered 'Fixed' or 'Variable'. Fixed categories are those defined as having a universal impact, independent of the local context (for example, Management). Variable categories are those defined as being variable locally, due to social, environmental, political or economic factors (for example, Water and Energy). BRE Global will take account of these factors when determining the relative importance of the environmental categories.

Assessment issues and credits

BREEAM Refurbishment Commercial V7 consists of 51 individual assessment issues across ten environmental categories, plus an eleventh 'Innovation' category. Each assessment issue addresses a specific building related environmental impact or issue and has a number of credits assigned to it.

BREEAM credits are awarded where a development meets the best practice performance levels defined for an assessment issue, i.e. it has mitigated an impact or, in the case of Health and wellbeing on page 92, addressed a specific building occupant-related issue, e.g. good thermal comfort, daylighting, or acoustics.

The number of credits available for an individual assessment issue will vary and generally reflect the importance of mitigating the impact of the assessment issue. In most cases, where there are multiple credits available, the number awarded is based on a sliding scale or benchmark, where progressively higher standards of building performance are rewarded with a higher number of credits.

It is worth noting that, in addition to the category scores and overall score and BREEAM rating, verified performance against individual assessment issues also provides users with a credible set of key building performance indicators for a range of embodied, operational and construction phase building impacts. In this respect, in addition to using BREEAM to define overall targets, it is possible to use the method to define performance levels in support of specific organisational policy objectives for individual environmental issues. Care should be taken when setting design targets using individual issues and credit levels in this way as it can limit design flexibility and have an impact on project costs.

Awarding credits for innovation

One of the aims of BREEAM is to support innovation within the construction industry and its supply chain. "Innovation" credits recognise sustainability benefits or performance levels that go beyond standard BREEAM assessment issues and criteria.

Awarding credits for innovation enables clients and design teams to boost their building's BREEAM performance and, in addition, helps to support the market for new innovative technologies, and design or construction practices.

BREEAM awards 'innovation credits' in two ways. First, by meeting exemplary performance criteria defined within an existing BREEAM issue, i.e. going beyond the standard BREEAM assessment criteria and therefore best practice. Not all assessment issues have exemplary performance criteria. Second, where an application is made to BRE Global by the registered project's BREEAM Assessor to have a particular building technology or feature, design or construction method or process recognised as 'innovative'. If the application is successful and subsequently compliance is verified, an 'Approved Innovation credit' can be awarded.

An additional 1% can be added to a building's overall score for each 'innovation credit' achieved. The maximum number of 'innovation credits' for any building is 10; therefore the maximum available additional score for 'innovation' is 10%. The building's final BREEAM score will be capped at 100%. Innovation credits can be awarded regardless of the building's final BREEAM rating, i.e. they can be awarded at any BREEAM rating level. For more detail, refer to Inn 01 Innovation on page 453.

Local codes and standards

Use of local codes and standards

Certain criteria in BREEAM require compliance with specified standards or best practice documents. In some countries there may be local equivalents of these standards and in these cases BREEAM Refurbishment allows BRE Global staff, with support from assessors and the project team, to review the local standards against BREEAM specified requirements and confirm their equivalence. The assessors need to send in the local standards to BRE Global for approval. Ideally the relevant sections of the standards will be translated into English; however, BRE Global can also provide this service for a fee.

If BRE Global approves the standard as equivalent, the local standard will form part of the approved standards for that country, region or area.

The individual requirements for a particular local standard and a list of approved standards are provided in the Approved Standards List (ASL).

For each BREEAM criterion requiring compliance with specified standards or best practice documents a combination of the following situations are likely, as circumstances vary between issues:

1. **Issue is not targeted (or not applicable) or pre-approved standards are used** – the standards section in the specific issues in the ASL does not have to be completed. Where a pre-approved standard is used, within the Assessor's commentary section in an issue in the BREEAM Platform, clear referencing should be present indicating where the standard has been included in the evidence. If a QA Auditor cannot confirm which standard has been used in the evidence and that the used standard is approved, this can result in a non-conformance
2. **Unapproved local standard is proposed** – at the earliest opportunity the project team informs BRE Global that they will be working to (as yet unapproved) local standards. The team will need to send the relevant sections of the standard to BRE Global, translated into English (if applicable).

   Note: The approvals process for local standards happens at the very early stages of a project assessment, i.e. well before a report is submitted for certification so that:

   a. Certification is not delayed, and
   b. The project team or client have certainty over which approved standards against which their building's performance is being assessed.

   If BRE Global approves the local equivalent, it is added to the 'approved standards' for that country or region.

More details on this process can be found within the BREEAM Operations Manual (SD5070), available on BREEAM Projects.

Calculating a BREEAM rating

A BREEAM Assessor must determine the BREEAM rating using the BREEAM Platform.

The process of determining a BREEAM rating is outlined below and an example calculation included in Table 6.

1. Determine the scope of the project being assessed.
2. The BREEAM Assessor will then award credits in accordance with the criteria of each assessment issue (as detailed in the technical sections of this document).
3. The percentage of credits achieved is then calculated for each category.
4. The percentage of credits achieved in each section is multiplied by the category weighting, giving the overall category score.
5. The category scores are added together to give the overall BREEAM score.
6. The overall score is then compared to the BREEAM rating benchmark levels and, provided all minimum standards have been met, the relevant BREEAM rating is achieved.
7. An additional 1% can be added to the final BREEAM score for each 'innovation credit' achieved (up to a maximum of 10% and with the total BREEAM score capped at 100%).

Table 6: Example BREEAM score and rating calculation for a fully fitted office with extension in Italy assessed using BREEAM Refurbishment V7

Category	Credits achieved	Credits available	Credits achieved, %	Category weighting	Category score, %
Management	14	21	66.67	0.111	7.40
Health and wellbeing	15	23	65.22	0.137	8.94
Energy	23	48	47.92	0.133	6.37
Transport	5	10	50.00	0.086	4.30
Water	6	12	50.00	0.086	4.30
Materials	9	13	69.23	0.121	8.38
Resilience	9	16	56.25	0.166	9.34
Waste	7	9	77.78	0.050	3.89
Land use and ecology	8	11	72.73	0.080	5.82
Pollution	6	9	66.67	0.030	2.00
Innovation	1	10	10.00	0.100	1.00
Final BREEAM score					61.74
BREEAM rating					VERY GOOD

Table 7: Minimum standards for a BREEAM Very Good rating

Minimum standards for BREEAM 'Very Good' rating	Achieved?
Man 03 Responsible construction	Yes
Man 04 Commissioning and handover	Yes
Hea 04 Indoor air quality	Yes
Ene 03 Energy monitoring	Yes
Wat 01 Water consumption	Yes
Wat 02 Water monitoring	Yes
Mat 03 Responsible sourcing of construction products	Yes

Evidence requirements

This section provides guidance to assessors and project teams on the types of evidence required to demonstrate compliance with BREEAM issues.

The BREEAM Assessor role

The role of the BREEAM Assessor is to objectively assess performance of an Asset against the BREEAM scheme and to gather project information to demonstrate compliance. To award a BREEAM credit, the assessor must be satisfied that the evidence gathered demonstrates unambiguous compliance with all relevant criteria defined in the BREEAM scheme. All evidence must be referenced appropriately by the assessor in the BREEAM Platform for quality assurance checks.

Clear and concise validation statements, referencing the evidence, must be provided for each BREEAM issue to demonstrate how each of the criteria have been addressed and credits awarded. This facilitates efficient quality assurance and certification decisions.

The BREEAM Assessor determines the BREEAM rating and their BREEAM Platform submission is the formal record of an assessor's audit against the criteria defined in the technical manual for a BREEAM scheme. The BREEAM certificate issued by BRE Global provides assurance that the service provided by the assessor, i.e. the assessment and determination of the BREEAM rating has been conducted in accordance with the requirements of the scheme.

Evidence types

Evidence does not necessarily need to be prepared specifically for the purpose of the BREEAM assessment. In many instances, the assessor should source readily available and prepared project information to demonstrate compliance. A list of common evidence types is provided in Table 8 on page 39.

Evidence must be provided to verify compliance with the relevant criteria for every BREEAM credit awarded by the assessor. Evidence should also be provided to justify when credits have been filtered out of a BREEAM assessment.

The BREEAM Assessor and project team will find that many assessment issues require more than one piece or type of information to demonstrate compliance with one criterion. Alternatively, one piece of information may be sufficient to demonstrate compliance with multiple criteria.

Acceptance of alternative forms of evidence

The Technical Manual sets out the evidence required for each issue, indicating which evidence is deemed to satisfy the evidential requirements and demonstrating that the criteria have been met. Each applicable evidence item is expected to be provided by the Client and submitted to QA by the Assessor as part of the certification process.

However, the Schedules of Evidence only provide a guide to help the assessor identify what types of supporting evidence are deemed acceptable for each issue or criterion.

Alternative evidence may be submitted without engaging the BREEAM Technical team via a Technical Query, provided it:

- clearly demonstrates compliance
- is referenced appropriately
- supports the assessor's justification for awarding the credit

Where alternative forms of evidence are submitted, the assessor must be satisfied that they meet the BREEAM Evidence Principles and are credible, robust, and traceable to the same assurance level as, or better than, specified evidence types defined in the technical manual. Where this is not the case, the Quality Assurance audit will identify it as a non-conformance, and a certification decision will be delayed until such time as the non-conformance is addressed.

Written commitments at the interim stage of assessment (design stage)

At the interim design stage of assessment, letters or emails to demonstrate intent to comply with BREEAM criteria can be used, provided they meet the requirements for communication records. Such evidence must make clear the actions that will be undertaken and evidence that will be provided, i.e. the commitment to ensure the project's compliance, particularly at the final stage of assessment. The party who makes the commitment must be clearly aware of the actions and evidence that needs to be undertaken and supplied to demonstrate compliance with BREEAM at the final stage of assessment. For example, in many circumstances it would not be acceptable for the design team to simply copy and paste the BREEAM criteria into a written commitment (BREEAM criteria do not generally prescribe solutions). The commitment should specifically detail how criteria are to be achieved (the solution) in the context of the assessment, and often copying and pasting the BREEAM criteria will not provide this detail. This therefore does not demonstrate the degree of confidence in the solution necessary for certification.

While letters of commitment can play a role in demonstrating compliance, they are not a replacement for more formal and established types of project information. The assessor must not award credits where they have a reason to doubt the validity or intent of written commitments, or where it is reasonable to expect formal design or specification information to be available to confirm compliance.

The evidence schedules are generally based upon submission of the assessment at Technical Design. Where submission is required to take place at an earlier stage, when some design information may not be advanced enough to satisfy all of the BREEAM design stage requirements, we request assessor’s provide justification for the early submission and alternative evidence must be robust and contractually binding.

The assessor must ensure that the evidence used is the most robust available for the project stage at the time of submission and therefore, should not always accept letters of commitment at design stage where more detailed design evidence is expected to be available.

Written commitments at the final stage of assessment (post-construction stage)

Two types of assessment can be carried out at the post-construction stage, a post-construction review of a design stage assessment, or a post-construction assessment where no design stage assessment has been carried out. The 'Final post-construction stage' column of the evidence table in each issue assumes that a design stage assessment has been completed and certified. Where a design stage assessment has not been completed, the assessor will need to review both the 'Interim design stage' and 'Final post-construction stage' evidence listed in the evidence table and ensure sufficient evidence is submitted with the assessment to demonstrate compliance with the criteria.

Evidence supplied at the post-construction stage must reflect the completed building and must therefore demonstrate what has actually been implemented. For example, if sub-meters have been specified at the design stage, evidence at the post-construction stage would need to demonstrate that these have actually been installed. Appropriate evidence may be a site inspection report with supporting photographs or final construction drawings or equivalent showing the location of the sub-meters. Where commitments or contract clauses rather than full design information was used to demonstrate compliance at design stage, or the design information is superseded, more detailed evidence will be required post-construction to confirm the final detailed design as well as verification that it has been implemented.

Letters of commitment cannot be used to demonstrate compliance at the final, post-construction stage of assessment. The only exception to this is where the criteria require an action to take place after handover and possibly during the initial stages of building operation, i.e. after completion of the post-construction stage of assessment. An example could be a written commitment from the building owner or occupier making a commitment to conduct post occupancy evaluation.

List of common evidence types

Table 8: Evidence types

Document or evidence type	Description and notes
As constructed information	Information produced at the end of a project to represent what has been constructed. This will comprise a mix of 'as-built' information or drawings and surveys from specialist subcontractors and the 'final construction issue' from design team members.
BRE Global correspondence reference number	For example, the reference number for a BRE Global response to an assessor's technical query.
BREEAM Assessor's site inspection report	A formal report based on the BREEAM Assessor's own survey of the site or building to confirm compliance with BREEAM criteria. This must include site photographs, which are linked to specific criteria, to verify the that the building has been constructed in line with the design specification or drawings provided.
Building contracts	The building contract (or excerpts or clauses from it) between the client and the contractor for the construction of the project. In some instances, the building contract may contain design duties for specialist subcontractors or design team members.
Building information model (BIM)	The BIM (or BIM files) used for the project containing relevant information or evidence of compliance.
Certificates of compliance (third party)	Examples include ISO 14001, BES 6001, FSC (Forest Stewardship Council), EPC (environmental profile certificate), EPD (environmental product declaration), Considerate Constructors etc.
Communication records	Formal communication records between or from relevant project stakeholders or other third parties confirming an appointment, action or outcome. This may be in the form of a letter, meeting minutes, email correspondence, publication or another form of media (see also additional guidance on following pages).
Communication strategy	The strategy that sets out when the project team will meet, how they will communicate effectively and the protocols for issuing information between the various parties, both informally and at information exchanges.
Construction specification	The specification for the project or building. For the purpose of BREEAM, the specific clause of the specification must be referenced within the report.
Construction stage data and information	For example, purchase orders, metering data, log books, commissioning records, reports etc.
Cost information	Project costs, including the cost estimate and life cycle costs.
Design drawings	Developed Design and Technical Design, including the coordinated architectural, structural and building services design, site plans, drainage designs. All drawings have the building or site name, phase (if applicable), title of drawing, author, date, revision number and a scale.
Design programme	A programme setting out the strategic dates in relation to the design process. It is aligned with the Project Programme but is strategic in its nature, due to the iterative nature of the design process, particularly in the early stages.
Design responsibility matrix	A matrix that sets out who is responsible for designing each aspect of the project and when. This document sets out the extent of any performance-specified design.
Feasibility study	Studies undertaken to test the feasibility of the Initial Project Brief for the site or in a specific context and to consider how site-wide issues will be addressed.
Formal correspondence	The document should be on company or organisation letterhead and include a signature (electronic signatures are acceptable). The document should be secured to prevent unauthorised access or modification. Though, where letters are provided as attachments to emails which are presented in their original format, offer a clear auditable trail and are provided by appropriate team members, the assessor can use their judgement on the robustness of the document. For further details, please refer to the sections on written commitment.

Document or evidence type	Description and notes
Meeting minutes	Include date, location and attendee information (names, organisations and roles), along with a record of the meeting and agreed actions.
Modelling results and outputs	Examples include thermal modelling, flooding, life cycle assessment, life cycle costing, ventilation modelling etc.
Other third-party information	For example, maps, public transportation timetables, product data or details, manufacturers' literature, government or EU standards or codes, EU labelling.
Professional services contract	An agreement to provide professional or consulting services such as designing, feasibility studies, or legal or technical advice.
Professional specialist reports	Professional reports resulting from specialist surveys, studies or test results, e.g. contaminated land, ecology, flood risk assessment, surface water run-off report, site investigation, acoustics, indoor air quality plan, low and zero carbon technologies study, transportation analysis, commissioning reports, passive design analysis report, free cooling analysis report, life cycle assessment, landscape and habitat management plan etc.
Project Execution or Quality Plan	The Project Execution Plan is produced in collaboration with the project lead and lead designer, with contributions from other designers and members of the project team. The Project Execution Plan sets out the processes and protocols to be used to develop the design.
Project programme	The overall period for the briefing, design, construction and post-completion activities of a project.
Project roles table	A table that sets out the roles required on a project as well as defining the stages during which those roles are required and the parties responsible for carrying out the roles.
Project strategy	The strategies developed in parallel with the Concept Design to support the design and, in certain instances, to respond to the Final Project Brief as it is concluded. Examples include strategies for sustainability, acoustics, handover, maintenance and operational, fire engineering, building control, technology, health and safety, construction, travel plan, sustainable procurement plan.
Risk assessment	The risk assessment considers the various design risks and other risks on a project and how each risk will be managed and the party responsible for managing each risk.
Schedule of services	A list of specific services and tasks to be undertaken by a party involved in the project which is incorporated into their professional services contract.
Strategic or initial project brief	The brief prepared following discussions with the client to ascertain the project objectives, the client's business case and, in certain instances, in response to site feasibility studies.

Evidence principles

To determine whether evidence types are appropriate for an assessment issue, the BREEAM Assessor must consider the BREEAM evidence principles in Table 9 below. Where the 'evidence types' meet the principles outlined in Table 9 below and the guidance provided in the 'robustness of evidence' section, where appropriate, such evidence is admissible for the assessment and the BRE Global Quality Assurance audit.

These principles are not listed in a hierarchical order and are all equally important when considering which evidence type to assess, reference and submit.

Table 9: BREEAM evidence principles

Principle	Objective	A question to ask to check
1. Evidence for all criteria and all credits sought		
Evidence demonstrates that ALL relevant criteria and sub-criteria are achieved for each credit sought and where relevant, is provided to support compliance notes, definitions etc. Where the assessor or design team deem specific criteria not relevant to the assessment, a full justification should be collated and then submitted as a technical query for review by BRE Global.	Completeness	Are all criteria covered? Have all relevant compliance notes, knowledge base entries (KBCNs) and definitions been addressed?
2. Unambiguous assessment		
The assessment demonstrates unambiguous compliance and the evidence supports this assessment. Evidence (and supporting notes) clearly demonstrate to a third-party reviewer that the criteria have been met.	Independent review compatibility	Would a third party (e.g. BRE Global) come to the same assessment decision as me based on the evidence submitted?
3. Robust		
Always ensure the evidence type selected is robust and relevant to the stage of assessment. Evidence selected contains all relevant basic information along with robust constituent parts that are needed. (For further details, see Robustness of evidence below.)	Proof that evidence is robust and from a reliable source	Using an assessor's judgement, is the evidence robust enough to demonstrate compliance with the criterion? Does the evidence contain all the relevant basic information? Does it provide a fully auditable trail of compliance?
4. Use existing evidence		
Use existing project information to demonstrate compliance. A significant proportion of the evidence should not need to be 'created' for BREEAM compliance purposes.	Minimises evidence and reduces time and cost of compliance	Does an existing type of project information robustly demonstrate compliance for the credits sought?

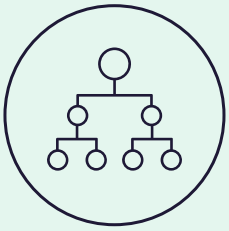
Robustness of evidence

Robust evidence provides confirmation that the assessment has been carried out correctly and the building complies with the criteria for the BREEAM credits sought. The assessor should consider the following when gathering project information and evaluating whether the evidence provided is as 'robust' as possible:

- Is there more than one piece of evidence that could be used to demonstrate compliance?
- Is the chosen evidence robust and appropriate to demonstrate that a particular criterion has been achieved?
- Is there a clear auditable trail with the document including key information such as the project name, the author, date, revision numbers (etc.)?

Any evidence submitted for a BREEAM assessment must be robust in terms of its source and its traceability. As a minimum, the assessor should identify within their validation statement the relevant page numbers, both of the document and if applicable PDF, and sections for the document where compliance has been confirmed.

Management



Summary

This category encourages the adoption of sustainable management practices in connection with design, construction, commissioning, handover and aftercare activities to ensure that robust sustainability objectives are set and followed through into the operation of the building. Issues in this section focus on embedding sustainability actions through the key stages of design, procurement and initial occupation from the initial project brief stage to the appropriate provision of aftercare.

Assessment issues

Man 01 Project brief and design	4 credits
Man 02 Life cycle cost and service life planning	4 credits
Man 03 Responsible construction	6 credits + 1 exemplary
Man 04 Commissioning and handover	up to 4 credits
Man 05 Aftercare	up to 3 credits + 1 exemplary

Man 01 Project brief and design

(all buildings)

Aim

To recognise and encourage an integrated design process that optimises building performance resulting from robust stakeholder engagement.

Overview

Assessment type	Credits available	Minimum standards	Applicable assessment criteria
Part 1: Fabric and structure	4	None	All
Part 2: Core services	4	None	All
Part 3: Local services	4	None	All
Part 4: Interior design	4	None	All

Assessment type specific notes

Ref	Assessment type specific note
-	None

Building type specific notes

Ref	Building type specific note
2.0	**Small-scale projects** For small-scale projects, a BREEAM Assessor can act as the BREEAM Advisory Professional (AP), without being a registered BREEAM AP. In this case, potential and actual conflicts of interest must be identified by the assessor and acknowledged in a written statement submitted alongside the assessment.
2.1	**Education buildings** An independent party must carry out the consultation exercise (see criterion 7).
2.2	**UK assessments only – Healthcare, Courts, and Major transportation hubs** An independent party must carry out the consultation exercise (see criterion 7).

Assessment criteria

One credit – Project planning

1 Prior to the completion of Concept Design, a specific project delivery workshop, in line with the requirements set out within M1.1, is held with the project team (Client, Design Team, end user (where known), building management representative (where known) and Principal Contractor (see M1.2 where not yet appointed)) to ensure:

1.a The project team has a clear understanding of the project aims, client's needs and expectations. This should include a review of lessons learnt from similar previous projects, to inform decisions.

1.b Specific end user requirements are determined.

1.c Roles and responsibilities of each project team member are identified, to clearly define who is delivering what and when it is required by.

1.d Chain of command and decision-making protocols are agreed.

1.e Success criteria, performance targets and evaluations methods are set.

1.f Any project constraints are understood.

2 Intermediate evaluation workshops are held at Developed Design, Technical Design and upon the appointment of the principal contractor. These must be documented and carried out to:

2.a Evaluate if the success criteria and performance targets are still appropriate or if adjustments required, ensuring that any changes are recorded and communicated to the project team.

2.b Track progress in achieving the performance targets and project success criteria.

2.c Review and update project requirements and/or constraints as necessary, in line with more detailed information such as report, survey or risk assessment outputs that may now be available.

2.d Ensure all new key stakeholders are aware of the project requirements and performance objectives and have the opportunity to provide input based on their experience and area of expertise.

3 At post-construction, project performance must be reviewed against the established success criteria and performance targets to assess how effectively the building delivered on its original design intent.

One credit – Stakeholder consultation

4 Prior to completion of the Concept Design, the design team consult with all interested parties on matters that cover the minimum consultation content (see M2).

5 The project must demonstrate concisely how the interested party contributions and outcomes of the consultation exercise have influenced or changed the initial project brief and concept design; and how these changes were implemented within the final design at post-construction.

6 Prior to completion of the detailed design (Technical Design or equivalent), consultation feedback has been given to, and received by, all relevant parties.

Additionally, for the following building types:
- **Education**
- **UK only: Healthcare, Courts, and Major transportation hubs**

7 An independent party carries out the consultation exercise.

One credit – BREEAM AP – Concept design

8 A BREEAM Advisory Professional (AP) has been appointed to facilitate setting and achieving BREEAM performance targets for the project. Their involvement must be early in the design process (see M3.2) to:

8.a Work with the project team, including the client, to consider the links between BREEAM issues and assist them in maximising the project's overall performance against BREEAM, from their appointment and throughout the Concept Design.

8.b Monitor progress against the agreed performance targets throughout all stages after their appointment where decisions critically impact the BREEAM performance.

8.c Proactively identify risks and opportunities related to achieving the agreed targets.

8.d Provide feedback to the project team as appropriate, to support them in taking corrective actions and achieving their agreed performance targets.

8.e Monitor and, where relevant, coordinate the generation of appropriate evidence by the project team.

9 The defined BREEAM performance targets have been formally agreed between the client and the design or project team no later than the concept design work stage.

10 To achieve this credit at the interim design stage assessment, the agreed BREEAM performance targets must be demonstrably achieved by the project design. This must be demonstrated via the BREEAM Assessor's design stage assessment report.

One credit – BREEAM AP – Monitoring progress

11 Achieve the credit for BREEAM AP – Concept design (criteria 8 to 10).

12 A BREEAM Advisory Professional (AP) has been appointed to monitor progress against the agreed BREEAM performance targets throughout the design process and formally report progress to the client and design team. They must:

12.a Work with the project team, including the client, to consider the links between BREEAM issues and to assist them in maximising the project's overall performance against BREEAM throughout Developed Design and Technical Design.

12.b Monitor progress against the performance targets agreed under criterion 9 throughout all stages where decisions critically impact the specification and tendering process and the BREEAM performance.

12.c Proactively identify risks and opportunities related to the achievement of the targets agreed under criterion 9.

12.d Provide feedback to the project team as appropriate, to support them in taking corrective actions and achieving their agreed performance targets.

12.e Monitor and, where relevant, coordinate the generation of appropriate evidence by the project team.

13 The BREEAM AP – Design must attend key project and design team meetings during the concept design, developed design and technical design work stages. Reporting must be carried out during and prior to completion of each stage, as a minimum.

Methodology

M1: Project planning

M1.1: Project delivery workshop

The intention of the workshop is to ensure all parties understand the client's requirements and purpose of the project. The workshop must be well-structured, and the outcomes clearly documented together with quantitative or qualitative targets to enable the project success to be measured. The workshop must cover the discussion points set out within Table 10 below.

Where discussion points are confirmed as not applicable to the specific project, a statement to confirm this must be provided i.e. It is confirmed there are no legal constraints that need to be considered.

Where items under the discussion points are still to be verified, such as the results of any surveys/risk assessments; it must be stated what actions are required, who has responsibility and the planned timeframe for completion. When the outcomes become available, this information can be conveyed at the next evaluation workshop and updated within the meeting records. The document can be developed with each stage of the project.

The 'examples of what should be covered', are to give guidance only for the type of information that could be covered against the discussion points.

The aim is to encourage the project to clearly define the success criteria and objectives for the project at an early stage so that the project team can track progress and measure their successfulness in achieving the project performance objectives. Where these are not achieved, this does not preclude the award of the credit, but in such instances, it must be analysed why they were not achieved and what could be done better in future.

Table 10: Discussion points for project delivery workshop

Item	Discussion points	Examples of what should be covered
A	Aims of the project	What is the building purpose and function? Does the client have any specific needs and expectations for the outcomes of the project such as quality of design and finishes, standard of workmanship required, aspirations for a high level of innovativeness or sustainability? Are these realistic in terms of the budget and timescales for the project?
B	Project success criteria	What are the defined success criteria and performance objectives for the project? How will these be measured? These could include any of the following (the list is a guide only and not definitive): 1. Meeting project delivery objectives a. On time b. On budget 2. Achieving quality standards a. Zero defects on building handover

Item	Discussion points	Examples of what should be covered
		b. Low defects in use 3. Delivering on design goals a. Project aims and requirements are achieved b. Building is fit for purpose c. Performance gap between the design expectations and the operational performance is reduced 4. Client satisfaction a. Expectations and needs are met/exceeded b. Client, user and stakeholders are happy with the results 5. Successful project management a. Good health and safety record b. Smooth/clean/tidy site c. Responsible/considerate construction management d. Minimal changes/disputes 6. Environmental performance a. See sustainability objectives (section H) and ecological outcomes (section L) b. Social impact – does it contribute positively to the community and social needs?
C	End user requirements	Confirmation of any operational outcomes, space requirements, thermal comfort requirements, specific design needs or any specialised plant and equipment that is necessary (where these are extensive, this may include a reference to another document such as room data sheets). There may also be specific requirements for robustness, safety or security that need to be considered.
D	Review of lessons learnt from previous similar projects	Such as occupant behaviour, how successful the control strategies were or any maintenance issues. For some projects such as those with very particular requirements or functions, this might include arranging visits to similar existing buildings to identify what has worked well and what improvements would be beneficial. This is discretional.
E	Roles and responsibilities	Who is responsible for delivering what, at which project stage and which parties are required to contribute? This should include details of where responsibilities are transferred through the project to another party such as the Principal Contractor. This should also include any professional appointments that are required such as specialist commissioning manager, ecologist or acoustician. This could include a copy of the Responsibilities Matrix when developed, or a summary of the discussions and decisions where this is not available.
F	Communication strategy and decision-making protocols	Identify the chain of command and process for issuing information or submitting for approval.
G	Evaluation process	Set out timeframes for re-evaluating the success criteria and performance targets, re-adjusting where required and tracking progress.
H	Sustainability objectives for the project – *Must include the BREEAM performance rating and at least three more specific targets*	To include measurable targets. This must include an overall building environmental assessment performance target such as required BREEAM rating, and at least three more specific targets. These could include for example: operational energy or water consumption performance targets, embodied carbon emissions, responsible sourcing of materials, material efficiency and construction waste arisings.
I	Technical constraints on the project	Specific requirements relating to building functionality or specific technical equipment required.
J	Construction constraints and considerations	Such as space, deliveries or noise restrictions and buildability issues
K	Legal constraints	Such as local building regulations or heritage requirements or party wall agreements which may impact the outcomes.

Item	Discussion points	Examples of what should be covered
L	Ecological outcomes	Details of any ecological features and protection measures and objectives for ecological enhancement.
M	Designing for resilience	Agree how resilience can be increased. Identify what risk assessments are required or what risks have been identified, such as natural hazards, climate change and security (refer to the Resilience section).
N	Designing for ease of commissioning	Identify any complex systems or equipment which will require specialist input or any interfaces between different systems. Consider appointment of a commissioning manager.
O	Designing for maintainability	Ensuring that consideration is given to maintenance access requirements together with the budget and technical expertise of the facilities management team who will be maintaining any proposed systems
P	Handover requirements	Process for commissioning, snagging, handover, training and end user documentation.
Q	Aftercare requirements	Requirements for aftercare provision, in-use commissioning or post occupancy evaluation.
R	Performance risk register	Developed for the success criteria identified at the initial workshop and used to track progress throughout the project. This should include qualitative and quantitative targets for both the project aims and sustainability objectives.

M1.2: Contractor involvement

The Principal Contractor's knowledge and experience can play an important role in the project planning stage, advising on the practicality and buildability of the design proposals, along with any potential impacts on programme or budget. In situations where the Contractor is still to be appointed at the time of the initial project delivery workshop (criterion 1), the project team must still give consideration to any potential buildability issues. For larger or more complex projects, where this input could be invaluable, the project team must appoint another party to perform this role on the Contractor's behalf. Where there is someone within the project team with substantial construction management or contracting experience already, such as the Project Manager, a separate appointment would not be required. This is not required for those projects meeting the definition of small-scale projects.

M2: Minimum consultation content

The minimum consultation content (see criterion 4 on page 44) of the consultation plan is dependent on the building but, where relevant, must include:

1. Functionality, build quality and impact (including aesthetics).
2. Provision of appropriate internal and external facilities (for future building occupants, visitors and users).
3. Management and operational implications.
4. Maintenance resources implications.
5. Impacts on the local community, e.g. local traffic or transportation impact - during and post construction.
6. Impacts on local wildlife and local ecology.
7. Opportunities for shared use of facilities and infrastructure with the community or appropriate stakeholders (this includes any existing shared facilities which are relied upon as well as any new facilities).
8. Compliance with statutory (national or local) consultation requirements.
9. Energy use and sustainability measures.
10. Implementing principles and processes that deliver an inclusive and accessible design.

In the case of educational building types, minimum content also includes:

11. How the building or grounds could best be designed to facilitate learning and provide a range of social spaces appropriate to the needs of a diverse range of pupils, students and other users, including people of all abilities.

In the case of building types containing technical areas or functions, e.g. laboratories, workshops etc., minimum content also includes:

12. The end users' broad requirements for such facilities, including appropriate sizing, optimisation and integration of equipment and systems.

In the case of transportation hubs, minimum content also includes:

13. How to ensure a smooth, safe and secure transition between different modes of transport (air, rail, road, bike and pedestrian, recognising the diversity of user needs including people of all ages and abilities).

M3: BREEAM AP

M3.1: Change of BREEAM AP during the project

The BREEAM AP must keep records of targets, reasons behind decisions, any risks and opportunities identified, and any feedback or advice provided to the project team to fully document their involvement. Whilst it is generally preferable to retain the same individual throughout the project for continuity, this may not always be feasible. The credits may still be awarded where the individual performing the role changes, provided the ongoing involvement of an AP is maintained in accordance with the criteria and all previous records and information are handed over to the new BREEAM AP.

M3.2: Early in the design process

The project team, including the client, agrees on performance targets early enough to enable a smooth process without posing unnecessary barriers to the achievement of criteria at a later stage. This is to ensure the performance targets will have an influence throughout the project, including prior to any required planning approval.

Compliance notes

Ref	Terms	Description
Project planning		
CN1	Building users unknown	Where the building user is unknown, it is still possible to achieve the credit. The building user requirements must be assumed and considered by other project parties (e.g. client, design team, etc.) using their experience and judgement until such time as the occupier is known.
BREEAM AP – Concept design / Monitoring progress		
CN2	Assessing and awarding the available credits for a BREEAM AP	There is an additional credit for appointing a BREEAM Advisory Professional (AP) (see Man 03 Responsible construction on page 59). The aim of the credit in Man 03 Responsible construction is to encourage and reward contractors and project teams that appoint a suitably qualified BREEAM AP and therefore ensure continuation of the sustainability objectives during the construction phase, and that the constructed building meets the client's target BREEAM rating.
CN3	Retrospectively applying BREEAM AP status	The BREEAM AP status cannot be applied retrospectively. The purpose of using a BREEAM AP on a project is that they can advise and steer the development from the outset to maximise its BREEAM and sustainability performance for the least cost/risk. If early AP appointment and involvement does not occur, then the aims and criteria of this BREEAM issue are not being met.
CN4	Achieving the design credit on a post-construction stage assessment (PCA)	Where a project will be undertaking a post-construction stage assessment only (with no interim assessment), to demonstrate that the criteria were met at the design stage a "BREEAM credit monitoring report" should be provided when the assessment is submitted, which shows that at the design stage of the project the building was still on target for the proposed BREEAM rating. This could be a spreadsheet showing the issues that the design is on target for achieving, with a short summary of how the BREEAM AP is steering the project towards the correct rating. As long as the criteria are met and the correct information can be gathered for your evidence, a design stage certification is not required. The performance target must be achieved at post-construction where no design stage certification is available.
CN5	BREEAM-related performance targets	If the BREEAM-related performance targets set at the end of the Concept Design stage have not been achieved by the interim design stage assessment, the credits for the BREEAM AP within Man 01 must be withheld.
CN6	BREEAM AP and BREEAM Assessor	An individual can be appointed as a BREEAM Assessor and BREEAM AP for the same project, where the Assessor also holds current and applicable BREEAM AP credentials. If this route is chosen, it must be made clear when submitting the assessment that both roles are being carried out by the same person and confirmed how potential conflicts of interest are identified and managed.

Ref	Terms	Description
BREEAM AP – Monitoring progress		
CN7	Assessment submitted prior to Technical Design	Where submission of the assessment takes place during the Developed Design stage, the credit may be awarded at design stage based on a commitment to carry out the role for the Technical Design phase of the project. Full evidence will be required at post-construction.

Evidence

Criteria	Interim design stage	Final post-construction stage
Project planning		
1–3	Initial Project Delivery Workshop meeting record including Performance Risk Register (Item R) Intermediate Evaluation Workshop meeting records.	Final review workshop on how the building has delivered on its design intent and performed against the success criteria and objectives. Any lessons learnt should also be documented.
Stakeholder consultation		
4	List all interested parties consulted. Records of consultation, as per M2.	No further actions required post-construction. No additional evidence is required other than that listed for the design stage.
5, 6	Documentary evidence or summary report on how the interested party stakeholder contributions and consultation outcomes influenced or changed the initial project brief and concept design. Documentation demonstrating the dissemination of feedback to all relevant parties.	Assessor site inspection report and photographic evidence to show examples of how the outcomes of the consultation with interested party stakeholder have been implemented within the final project design.
7	In addition to the items listed against criterion 4 to 6, evidence to confirm the consultation exercise was completed by an independent party. UK projects: Results from Design Quality Indicator (DQI) and the Achieving Excellence Design Evaluation Toolkit (AEDET) where used.	No further actions required post-construction. No additional evidence is required other than that listed for the design stage.
BREEAM AP		
8–13	The BREEAM AP appointment letter and verification of their AP status. Relevant section or clauses of the building specification or contract or other formal documentation to confirm BREEAM performance target. Project programme or evidence indicating the dates for the key project design stages. Meeting minutes, communication records, formal notes of conversations or other statements reporting on discussions related to performance targets and maximising performance, to demonstrate ongoing involvement and AP attendance at key project meetings.	No further actions required post-construction. Interim design stage certificate showing performance target has been achieved. If undertaking a PCA, please see CN4.

Criteria	Interim design stage	Final post-construction stage
	BREEAM AP progress reports (for each work stage: Concept Design, Developed Design and Technical Design).	

Definitions

BREEAM Advisory Professional (AP)

An individual trained and qualified by BRE as a specialist in built environment sustainability, environmental design and assessment. The role of the BREEAM AP is to provide advice to the project team, 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. Only qualified individuals who are members of BRE's associated membership scheme comply with the BREEAM requirements. This membership ensures an adequate level of competence is maintained through regular continuing professional development (CPD) in key relevant areas. For a list and contact details of qualified BREEAM APs, visit: www.greenbooklive.com.

The assessor must ensure that the BREEAM AP qualification was valid at the time of appointment and maintained throughout their involvement in the relevant project stages.

BREEAM AP Design and Site can function as AP during the design phase.

BREEAM AP Operations (US) only cover the in-use phase of BREEAM and are not compliant for this issue.

Communication strategy

The communication strategy is defined as a strategy that sets out when the project team will meet, how they will communicate effectively, and the protocols for issuing information between the various parties, both informally and at information exchanges. This does not have to be contained within standalone, specific communication strategy plan and may form part of another project procedural plan.

Concept design

The concept design work stage includes the development of strategies and outline proposals for site planning, built form, structural design, building services systems, outline specifications and preliminary cost information.

Constraints

Some projects may have limitations applied, such as certain size and height restrictions, limited by planning authorities. The project could also be in a conservation area or protected by historic building status. Other factors could be legal covenants, ecology or biodiversity protection laws, or flood risk considerations. Normal national or local construction standards are not considered to be constraints in this context.

Consultation feedback

This is feedback which focuses on the stakeholder suggestions, comments, recommendations and the consultation outcomes. This includes how the suggestions and outcomes influenced, or resulted in modifications to, the proposed design and building operation and use.

Design team meetings

Design team meetings can be defined as those where fundamental decisions that influence or affect the building's proposed design and its construction in accordance with the design (and therefore the building's sustainability impacts and BREEAM performance), are discussed and made. Design team meetings can be conducted via conference calls. These meetings would typically include representatives from at least three of the parties listed below:

1. Representatives of the client or developer
2. The principal contractor
3. The architect
4. Structural engineers
5. Building services engineers

6. Cost consultants
7. BREEAM AP and other sustainability consultants
8. Project management consultants

Developed design

The developed design work stage includes the coordination and updating of proposals for structural design, building services systems, outline specifications, cost information and project strategies.

Formally agreed

The term 'formally agreed' relates to BREEAM performance targets. Examples of formal agreements include:

— Contract documentation or letters of appointment with the architect and other relevant project team members.
— Meeting minutes dated at the appropriate project stage where design team members are present or are on the distribution and the rating has been confirmed as a client requirement.
— Evidence that the BREEAM rating is a planning requirement.
— Confirmation from the client in the form of a letter/email issued at an appropriate project stage to the relevant parties confirming the performance requirements or stating that a document such as pre-assessment report forms part of the contract documentation (where dated early in the design process).

Independent party

To comply with building type specific note 2.1, relating to the use of an independent party, the client or design team needs to demonstrate EITHER of the following options:

1. They have used a party independent of the design process to conduct the necessary consultation exercise, using a compliant method OR
2. If the consultation is to be carried out by an organisation involved with the design of the building, e.g. the project architect, then they must present the assessor with evidence that robustly demonstrates the independence of the consultation process. BREEAM has not attempted to define what form this evidence must take. The onus is on the design team or relevant individual to clearly demonstrate to the BREEAM Assessor a credible level of independence.

In addition, for UK projects, the Design Quality Indicator (DQI) and the Achieving Excellence Design Evaluation Toolkit (AEDET) may be used as methods to assess the design quality of buildings.

Interested parties

This includes, but is not limited to the following:

1. Actual or intended building users (if known) including facilities management (FM) staff or those responsible for the day-to-day operation of the building and grounds.
2. Where applicable, existing building users occupying spaces outside of the refurbishment areas.
3. A representative consultation group from the existing community (if the building is a new development in an existing community) or for a community still under construction.
4. Existing partnerships and networks that have knowledge of, and experience of working on, existing buildings of the same type.
5. Any neighbours, local community groups and wildlife groups likely to have interests or concerns on the potential impacts relating to the site and adjoining areas before, during and after construction.
6. Potential users of any shared facilities, e.g. operators of clubs and community groups.

AND the following where relevant:

7. In educational buildings, representatives from the local education authority, school board etc.
8. Local or national historic or heritage groups (over and above any requirements relating to statutory consultees).
9. Specialist service and maintenance contractors and representatives where the building function has technical requirements in complex environments, e.g. buildings containing laboratories.

Key phases

The definition of key phases of project delivery includes the following:

— Concept design
— Developed design
— Technical design

- Construction
- Commissioning and handover
- In-use occupation

Major transportation hub

This includes major airports, railway stations, bus terminals or seaports which have high volumes of passengers, multimodal transport interchanges and provide national and/or international travel links.

Performance targets

BREEAM performance targets refer specifically to the BREEAM rating and minimum standards required. This does not necessarily include individual targeted BREEAM issues or credits, which may be traded over the course of the project as it evolves. In agreeing a BREEAM target, it is recommended that individual BREEAM issues, credits and criteria are targeted or prioritised. This is to ensure that the agreed target is achievable and achieved without potentially costly alterations to the design at a later stage. Only the overall BREEAM rating is required to be targeted (e.g. Excellent) and not a specific percentage score.

Project team

The project team includes the client, the building occupier (where known), the design team, and the principal contractor. See also M1.

Small-scale projects

For the purposes of this issue, small-scale projects are defined as projects up to 500 m² gross internal floor area.

Technical design

The technical design work stage is the stage at which all architectural, structural and building service design information, specialist subcontractor design and specifications are finalised.

Additional information

Soft Landings Framework

Soft landings is a process designed to help the project team focus more on the client's needs throughout the project. It lists activities to be carried out at each stage of the project, from the start of design to occupation. Measures include the inclusion of success criteria along with the setting of operational performance targets at the beginning of a project. These will help the project team monitor if these are being met throughout the project and allow them to evaluate how successful the project has been on completion in meeting the performance objectives. The overall aim is to reduce the performance gap between the building design intent and their actual in-use performance.

Embedding the principles of this framework within a project should ensure that the evidence is available to demonstrate compliance with the Project planning credit.

Guidance can be found in the following documents:

1. BSRIA BG 54/2018 Soft Landings Framework 2018
2. BSRIA BG 74/ 2019 Success Criteria for Soft Landings Projects
3. BSRIA BG 76/2019 Soft Landings and Design for Performance
4. BSRIA BG 81/2022 Soft Landings for Fit-Outs
5. Better Buildings Partnership Soft Landings: The Benefits to Commercial Property Owners, June 2020

Man 02 Life cycle cost and service life planning

(all buildings)

Aim

To promote whole-life value by embedding life cycle costing and service life planning into the design and decision-making process. This encourages project teams to consider capital costs alongside long-term operational, maintenance, and replacement costs, leading to more informed and sustainable design choices. The issue also supports transparent and consistent cost reporting to enable effective evaluation of economic performance over the building's lifespan.

Overview

Assessment type	Credits available	Minimum standards	Applicable assessment criteria
Part 1: Fabric and structure	4	None	All
Part 2: Core services	4	None	All
Part 3: Local services	4	None	All
Part 4: Interior design	4	None	All

Assessment type specific notes

Ref	Assessment type specific note
-	None

Building type specific notes

Ref	Building type specific note
-	None

Assessment criteria

Two credits – Elemental LCC options appraisal

1 A competent person carries out an outline, entire asset (whole building) elemental life cycle cost (LCC) plan and options appraisal (at least two alternatives) at the Concept Design stage in line with ISO 15686-5:2017.(2)

2 The elemental LCC plan:

2.a Provides an indication of future replacement costs over a period of analysis, based on the design life expectancy of the building (e.g. 25, 50, 60 or 60+ years).

2.b Includes allowances for service life.

2.c Includes for replacement, maintenance and operation cost estimates.

2.d Includes only those elements relevant to the assessed scope of works.

> The period of analysis should ideally be agreed by the client, in line with the design life expectancy of the building. However, where the design life is not yet formally agreed (due to being at very

early design stages), the default design life of 60 years should be used for modelling purposes.

3 Demonstrate, using appropriate examples provided by the design team (see M1), how the entire asset elemental LCC plan has been used to influence building and systems design and specification to minimise life cycle costs and maximise critical value.

One credit – Component level LCC options appraisal

4 A competent person develops component level LCC options appraisals (at least two alternatives for each applicable sub-element or component) by the end of Technical Design stage (equivalent to Process Stage 4) in line with ISO 15686-5:2017. The period of analysis should be in line with the design life expectancy of the building and the LCC should include the following element types (where present):

4.a Part 1 assessments: Envelope (e.g. cladding, windows, or roofing).

4.b Part 2 and 3 assessments: Services (e.g. heat source, cooling source or controls, also intelligent lighting controls against standard controls).

4.c Part 4 assessments: Finishes (e.g. walls, floors or ceilings).

4.d External spaces (e.g. alternative hard landscaping, boundary protection).

The component level LCC options appraisal should review all of the above element types (where present). However, it is not required to consider all the sub-elements cited under each element; only a selection of those most likely to draw valued comparisons. This is to ensure that a wide range of alternatives are considered and help focus the analysis on the sub-elements or components which would benefit the most from appraisal.

5 Demonstrate, using appropriate examples provided by the design team (see M1), how the component level LCC options appraisal has been used to influence building and systems design, and specification to minimise life cycle costs and maximise critical value.

One credit – Capital cost reporting

6 Report the capital cost for the refurbishment or fit-out works per unit of gross internal area (GIA).

For more details, see M2 and Additional information.

Methodology

M1: Appropriate examples of LCC options appraisals

The options selected to demonstrate how life cycle costs have been minimised and critical value maximised must be appropriate in terms of their relative impact on project costs, future building maintenance burden and/or size (volume or area) and the stage of the project (see criteria 3 and 5).

The LCC option appraisals at each stage must consider:

— At least **two** design alternatives (which could be for the base case plus at least one other option) and,

— Include comparison cash flow scenarios for each alternative, in order to determine the most appropriate option.

This allows project teams and clients to make informed choices about the long-term financial implications of alternative design and/or specification decisions.

At Concept Design stage, when considering the outputs from the elemental LCC plan, examples could be in the form of alternative specifications (where appropriate), evolutions in concept design to reduce maintenance or replacement costs or opportunities to maximise the critical value of the asset.

At Technical Design stage, when considering the outputs from the component level LCC options appraisal, examples are likely to be in the form of alternative component specifications and justifications for their selection must be provided (i.e. how they reduce life cycle costs and maximise critical value). Please note that LED lamps are not to be included as an option, as these are now a standard form of lighting. As a principle, only make meaningful comparisons between systems which would genuinely be used in the project.

M2: Capital cost reporting

At design stage, if the final information is not available, award the credit if the client provides the predicted capital cost, including contingencies, and commits to providing this information for the final assessment stage. At the final stage, if the final capital cost is not known, provide the client's or cost consultant's best estimate. This data will be anonymised and used to inform future BREEAM performance benchmarking.

It must be clear what the figures for capital cost include and exclude, in line with the definition for capital cost.

M3: Pre-defined specifications

Where the refurbishment is carried out to a pre-defined and set specification, such as a corporate-wide standardised design and specification which limits the alternatives that can be considered (such as where all buildings within a chain are required to be constructed to the same standard and branding), either:

- Complete LCC with options appraisals based on those items which are subject to change. OR
- Where there is no scope to make changes for all or some of the building elements, credits may only be achieved where a compliant LCC plan and options appraisal was carried out for the pre-defined corporate design and specification.

Compliance notes

Ref	Terms	Description
CN1	Independent assessment of the sections of the criteria	All three sections of the criteria can be awarded independently from one another. For example, the project team can still target the one credit for the component level LCC option appraisal at Technical Design if they have not been awarded the elemental LCC options appraisal credits at Concept Design. The capital cost reporting credit can also be awarded independently from the other two parts.
CN2	Life cycle cost – Multiple assessments on the same site	Where there are multiple assessments on a site and a single life cycle cost (LCC) plan will be carried out, it is acceptable to use this plan as evidence provided that the results of the LCC plan can be applied to all of the assessed buildings and therefore may have a positive influence on the material specification of such buildings. Where the design and specification differs between assessments to the extent that the LCC plan cannot reasonably be applied to multiple assessments, separate LCC plans for each will be necessary to achieve credits for this issue. Where multiple assessments are covered under a single LCC plan, there must be sufficient detail for each building to enable them to be adequately assessed.
CN3	Historic buildings	Where a relevant conservation authority sets explicit requirements and conservation conditions limiting the kinds of materials and construction product types that can be used, the LCC plans must be based on this limited selection. If only one material or product type is allowed, this is excluded from the study. Relevant conservation authorities can include organisations such as UNESCO, a national / local heritage body, or local government.

Evidence

Criteria	Interim design stage	Final post-construction stage
Elemental LCC options appraisal		
1–2	Elemental LCC plan.	No further actions required post-construction.

Criteria	Interim design stage	Final post-construction stage
		No additional evidence is required other than that listed for the design stage.
3	Confirmation from the design team as to how the LCC has influenced design/specification and drawings/specifications to support this.	Final construction drawings or equivalent or assessor site inspection report and photographic evidence to show how the outcomes of LCC options appraisal have been implemented within the final design.
Component level LCC options appraisal		
4	Component level LCC options appraisal.	No further actions required post-construction. No additional evidence is required other than that listed for the design stage.
5	Confirmation from the design team as to how the LCC has influenced design/specification and drawings/specifications to support this.	Final construction drawings or equivalent or assessor site inspection report and photographic evidence to show how the outcomes of LCC options appraisal have been implemented within the final design.
Capital cost reporting		
6	Predicted capital costs.	Final capital cost.

Definitions

Capital cost

The capital cost for the building includes the expenses related to the initial construction of the building:

- Construction, including preparatory works, materials, equipment and labour
- Site management
- Construction financing
- Insurance and taxes during construction
- Inspection and testing

Costs relating to land procurement, clearance, design, statutory approvals and post occupancy aftercare should not be included.

Competent person

An individual achieving all the following items can be considered to be 'suitably qualified' for the purpose of completing the LCC credits:

1. Holds a recognised qualification for undertaking life cycle costing studies and/or a degree/postgraduate diploma or equivalent qualification in quantity surveying, construction economics or other construction-related subject.
2. Has acquired substantial expertise through a minimum of three years relevant experience (within the last five years). The experience must clearly demonstrate a practical understanding of life cycle costing in construction and the built environment and show an ability to identify and demonstrate cost and performance enhancement measures.
3. Is not professionally connected to a single manufacturer.

A CV or Letter of Competency must be provided demonstrating their experience and knowledge against the above requirements.

Component level LCC options appraisal

A component level LCC plan is commonly used for cost planning specification choices of sub-elements, systems, or components during design development. Component level LCC appraisal requires, for service life planning, the environment of the building and other local conditions to be identified, and decisions should be made on:

- The likely design life of the building (rather than the contractual design life).
- Minimum functional performance criteria for each component over the building's design life.

— Components that must be repairable, maintainable or replaceable within the design life of the building. Only the key differentiators between components and systems need to be comparatively modelled.

Critical value

Critical value aims to *maximise whole life value* of the building based on client requirements and differs from minimising life cycle cost. This is a more specific analysis of how the built asset can impact business needs. For instance:

— Optimising the size and nature of the asset to match the present and future requirements of the business.
— Where any disruption to business is costly, a specification with long periods between maintenance cycles and reduced maintenance time may be desirable.
— Where maintaining aesthetics are important, a maintenance cycle may be based on aesthetic upkeep rather than functional lifespan.
— Where maximum recyclability and re-usability is important, an alternative, costlier specification may be required.
— Where capital costs are constrained, the specification with the lowest LCC may not be affordable, and instead, the best available option within the budget is chosen.

Elemental LCC plan

This is commonly used for developing solutions at project level during option appraisals. Costs are normally at building elemental level on the entire asset. Information may be a mix of typical benchmark costs for key elements, comparative cost modelling or approximate estimates. It is expressed as cost per square metre of gross internal area (GIA) and presented for elemental analysis, aligned to the level of capital cost plans.

Life cycle cost (LCC)

The cost of an asset or its parts throughout its life cycle, while fulfilling the performance requirements; a methodology for systematic economic evaluation of life cycle costs over a period of analysis, as defined in the agreed scope.

Additional information

Capital cost reporting

The lack of data relating to capital and life cycle costs and benefits arising from more sustainable building design presents a major barrier to take-up of more sustainable solutions. This issue seeks to encourage the sharing of data to break down these barriers and ensure that BREEAM continues to encourage cost effective and financially beneficial solutions. This information is collected to assist research into the cost and savings of developing sustainable or BREEAM-assessed buildings. This is used to inform the business case for sustainability and the ongoing development of BREEAM. All data submitted will only be used anonymously to create new products and services.

When to undertake life cycle costing

Life cycle costing is relevant throughout the building or constructed asset's life cycle including during project planning, design, construction, and in-use phases. For further information please refer to ISO 15686-5:2017.

Methodology for life cycle costing (LCC) for construction

ISO 15686-5:2017 provides the principles and methodology for life cycle costing (LCC) of buildings and constructed assets. The objectives of this standard are to provide:

1. LCC practitioners with a standardised method of applying life cycle costing, applicable to the construction industry and to the key stages of the procurement process.
2. Process mapping the LCC stages – to help structure how to plan, generate, interpret and present the results for a variety of different purposes and levels of LCC planning.
3. Instructions on how to define the client's specific requirements for life cycle costing and the required outputs and forms of reporting – and to decide on which method of economic evaluation to apply.
4. Simplification and demystification – by providing practical guidance, instructions and definitions, together with informative worked examples on how to undertake life cycle costing (for construction).
5. Provide a methodology to facilitate a more accurate, consistent and robust application of LCC estimation and option appraisals, thereby creating a more effective and robust basis for LCC analysis and benchmarking. ISO 15686-5:2017 also seeks to help eliminate confusion over scoping and terminology and to address concerns over the uncertainty and risks that are undermining confidence in life cycle costs used for construction procurement.

Please also refer to:

— **ICMS 3: Global consistency in presenting construction life cycle costs and carbon emissions, 3rd edition, November 2021.**

For the UK, please also refer to:

— **RICS professional guidance note: Life cycle costing, 1st Edition, April 2016.** This includes standards and definitions, essentials of life cycle costing, worked examples and covers both new construction works and refurbishment of existing assets.

— **RICS NRM 3: Order of cost estimating and cost planning for building maintenance works, 2nd Edition, October 2021.** Provides a structured basis for measuring building maintenance works and presents a consistent approach for dealing with other key cost components associated with a building project when preparing order of cost estimates and elemental cost plans.

— **BS 8544: 2013, Guide for life cycle costing of maintenance during the in-use phases of buildings.**

— **BSRIA Guide BG 67/2016.** This presents a practical approach to LCC for the construction and operation of buildings and is compatible with the parts of ISO 15686 that provide recommendations for life cycle costing. This document can be used as guidance illustrating the principles of LCC. It provides examples on identifying alternative solutions, calculating and fine-tuning life cycle costs, as well as interpreting the results of this analysis.

For the USA, please refer to ASTM E917-17e1 Standard Practice for Measuring Life-Cycle Costs of Buildings and Building Systems

The scope of this document is set out below:

1. This practice establishes a procedure for evaluating the life-cycle cost (LCC) of a building or building system and comparing the LCCs of alternative building designs or systems that satisfy the same functional requirements.
2. The LCC method measures, in present-value or annual-value terms, the sum of all relevant costs associated with owning and operating a building or building system over a specified time period.
3. The basic premise of the LCC method is that to an investor or decision maker all costs arising from an investment decision are potentially important to that decision, including future as well as present costs. Applied to buildings or building systems, the LCC encompasses all relevant costs over a designated study period, including the costs of designing, purchasing/leasing, constructing/installing, operating, maintaining, repairing, replacing, and disposing of a particular building design or system.
4. The values stated in inch-pound units are to be regarded as standard. The values given in parentheses are mathematical conversions to SI units that are provided for information only and are not considered standard.

Man 03 Responsible construction

(all buildings)

Aim

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

Overview

Assessment type	Credits available	Minimum standards	Applicable assessment criteria
Part 1: Fabric and structure	6 + 1 exemplary	Pass, Excellent, Outstanding	All
Part 2: Core services	6 + 1 exemplary	Pass, Excellent, Outstanding	All
Part 3: Local services	6 + 1 exemplary	Pass, Excellent, Outstanding	All
Part 4: Interior design	6 + 1 exemplary	Pass, Excellent, Outstanding	All
EU Taxonomy	-	-	5 and/or 9–10 (items d and e in Table 11)

Assessment type specific notes

Ref	Assessment type specific note
1.0	**All countries except UK** Projects in all countries except the UK will need to address the prerequisite ('Health and safety legislation', criterion 2) in order to achieve any BREEAM rating.

Building type specific notes

Ref	Building type specific note
2.0	**Small-scale projects** *BREEAM Advisory Professional – Site*: For small-scale projects, a BREEAM Assessor can act as the BREEAM Advisory Professional (AP), without being a registered BREEAM AP. In this case, potential and actual conflicts of interest must be identified by the assessor and acknowledged in a written statement submitted alongside the assessment. *Responsible construction management*: Projects may follow criterion 9 to award credits instead of criterion 10.
2.1	**UK Healthcare projects** For NHS healthcare assessments, please see criterion 3.

Assessment criteria

Prerequisite – Legally harvested and traded site timber

1 All temporary site timber and timber-based products (excluding timber verified as being reused, recycled, or reclaimed) used during the construction process of the project must be 'Legally harvested and traded timber'.

Prerequisite – Health and safety legislation (all countries except UK)

2 All national health and safety legislation and regulations for construction sites are considered and implemented during all phases of the project (see CN1 on page 65):

2.a The design of the asset: to minimise health and safety risks.

2.b Pre-construction work planning and organisation: to collate health and safety information from all relevant stakeholders.

2.c Site set-up: to implement health and safety features.

2.d Construction: to manage, monitor and report on the health and safety of construction site staff. This should be summarised in a report.

Prerequisite – For UK Healthcare NHS buildings only

3 To award any of the credits available for this issue, any party who at any stage manages the construction site (e.g. the principal contractor, the demolition contractor) must operate an Environmental Management System (EMS) (see requirements of criterion 4).

One credit – Environmental management

4 All parties who manage the construction site at any stage must operate an environmental management system (EMS) covering their main operations. The EMS must be third-party certified to ISO 14001, EMAS (EU Eco-Management and Audit Scheme), or an equivalent standard.

5 All parties who manage the construction site at any stage (for example, the principal contractor or demolition contractor) must implement best practice pollution prevention policies and procedures on site. To demonstrate compliance the project team should complete the checklist given in Table 12 on page 63 showing how the intent of every section (e.g. air quality) has been met, even if by different means than the actions suggested.

One credit – BREEAM Advisory Professional – Site

6 The client must formally agree with the contractor the performance targets relating to the BREEAM certification that have been set for the project.

7 A BREEAM AP must be involved in the project at an appropriate time and level to ensure that the agreed performance targets are met. Specifically, the AP will:

7.a Work with the project team, including the client, to help them maximize performance against the agreed targets throughout construction, handover and closeout. This support will include providing advice as needed and considering links between the criteria that need to be met across all project areas to be assessed by BREEAM (e.g., Management, Energy, Ecology etc), going beyond the design intent wherever possible.

7.b Monitor progress against the agreed performance targets throughout all stages of the construction, paying particular attention wherever decisions are made that could critically impact the BREEAM performance, and keeping all records needed as evidence for the assessment.

7.c Proactively identify risks and opportunities related to the procurement and construction processes and the achievement of the targets agreed under criterion 6.

7.d Feedback promptly and regularly to the contractor and project team helping the project stay on track to meet its targets and supporting any necessary corrective actions.

7.e Where appropriate, coordinate the project team to provide the assessor with the necessary evidence to achieve the credits.

8 To achieve this credit at the final post-construction stage of assessment, the submitted assessor's report must show that a BREEAM AP was appointed at an appropriate time and that the agreed performance targets have been demonstrably achieved by the project.

Up to two credits – Responsible construction management

9 For small-scale projects:

9.a The contractor must achieve items listed f, h, i, j and m (as listed within Table 11) to achieve one credit.

9.b Where the contractor achieves those items checked as 'required for one credit (for standard projects)' in Table 11, the small-scale project may achieve two credits.

10 For all other projects (standard projects), credits are awarded as follows:

10.a All items checked as 'required for one credit (for standard projects)' in Table 11 must be achieved for one credit to be awarded.

10.b Projects achieving criterion 10.a plus six additional items in Table 11 may be awarded a second credit.

Table 11: Checklist of the required criteria to achieve credits for responsible construction management

Ref.	Criteria	Required for one credit (for standard projects)
Risk evaluation and implementation		
The principal contractor evaluates the risks (on site and off site), plans and implements actions to minimise the identified risks, covering the following, as appropriate:		
Vehicle movement		
a	Manage the construction site entrance to minimise the impacts (e.g. safety, disruption) arising from vehicles approaching and leaving the development footprint.	✓
b	Ensure the development footprint is accessible for delivery vehicles fitted with safety features (e.g. side under run protection) to remove or limit the need for on-street loading or unloading. Where on-street loading is unavoidable, this should be appropriately managed.	
c	Identify access routes to the development footprint, including for heavy vehicles to minimise traffic disruption and safety risks to others.	
Pollution management		
d	Minimise the risks of air, land and water pollution.	✓
e	Minimise the risks of nuisance from vibration, light and noise pollution.	✓
Tidiness		
f	Implement practices to ensure the development footprint is safe, clean and organised at all times. This includes, but is not limited to, facilities, materials and waste storage.	✓
g	Ensure clear and safe access in and around the buildings at the point of handover.	✓
Health and wellbeing		
h	Provide processes and equipment required to respond to medical emergencies.	✓
i	Identify and implement initiatives to promote and maintain the health and wellbeing of all site operatives within the development footprint. This can involve site facilities, site management arrangements, staff policies etc.	✓
j	Establish management practices and facilities encouraging equality, fair treatment and respect of all site operatives and visitors.	✓
k	Provide secure, clean and organised facilities (e.g. welfare, changing and storage facilities) for site operatives within the development footprint.	
Security processes		
l	Minimise risks of the site becoming a focus for antisocial behaviour in the local community (e.g. robust perimeter fencing, CCTV, avoid creating dark corners etc.).	
Training, awareness and feedback		
See definition of training. The principal contractor is responsible for:		
m	Minimising nuisance and intrusion on the lives of the local community, and engaging with the community and neighbourhood to ensure that any unavoidable impacts of	✓

Ref.	Criteria	Required for one credit (for standard projects)
	construction are communicated regularly and sensitively.	
n	Ensuring ongoing and up-to-date training is provided for personnel and visitors (covering items a to l, as appropriate.)	
o	Ensuring all site operatives are trained for the tasks they are undertaking (including any site-specific considerations).	
p	Promoting safety on and off-site by ensuring that appropriate driving, operator training, and safety awareness have been undertaken for: — all on-site moveable plant and equipment that is owned, leased, or hired by the principal contractor, or provided by subcontractors, and — all company vehicles (cars and vans), trucks, lorries, and waste-removal wagons that are owned, leased, or hired by the principal contractor.	
Monitoring and reporting		
The principal contractor ensures:		
q	Any vehicular accidents, incidents and near misses, on-site or in the vicinity of the site entrance and relating to site activities, are recorded, investigated and analysed and that learnings are incorporated in updated policies and training.	
r	All visitor, workforce and community accidents, incidents and near misses are recorded and action is taken to reduce the likelihood of them reoccurring.	✓
s	Processes are in place to facilitate collecting and recording feedback from the community and to address any concerns related to the development footprint.	

Up to two credits – Site monitoring

11 Assign responsibility for site monitoring to a named individual. This is a prerequisite for the award of any of the site monitoring credits set out below. The responsible individual must have the appropriate authority and experience to access the data required. They may be the BREEAM AP, where one has been appointed. They will be required to monitor, record and report on energy use, water consumption and transport data (where measured) resulting from all on-site construction processes (and dedicated off-site manufacturing) throughout the build programme. Report the project value. This is a prerequisite to achieving criteria 12 to 19.

One credit – Monitoring utility consumption

Energy consumption

12 Set targets at design stage for the site energy consumption in kWh (and where relevant, litres of fuel used) resulting from the use of construction plant, equipment (mobile and fixed), and site accommodation.

13 Monitor and record data for the energy consumption described in criterion 12 and show that the consumption targets have been achieved.

14 Report the total carbon dioxide emissions (total $kgCO_2e$) and energy consumption (electricity in kWh and litres of fuel) resulting from the construction process.

Water consumption

15 Set targets at design stage for the potable water consumption (m^3) arising from the use of construction plant, equipment (mobile and fixed), and site accommodation.

16 Monitor and record data for the potable water consumption described in criterion 15 and show that the consumption targets have been achieved.

17 Use the collated data to report the total net water consumption resulting from the construction process (m^3), i.e. consumption minus any recycled water use.

One credit – Monitoring transport of construction materials and waste

18 Set targets at design stage and monitor and record data relating to transport movements and other impacts resulting from delivery of the majority of construction materials to the site and removal of construction/demolition waste from the site (see M4). As a minimum this must cover:

18.a Transport of materials from the point of supply to the building site, including any transport, intermediate storage and distribution.

18.b The scope of this monitoring must cover the materials used within the following as a minimum:

18.b.i Where Part 1 is being assessed: Superstructure, as listed in Table 84 in Mat 03.

18.b.ii Where Part 2 or Part 3 are being assessed: Building services, as listed in Table 85 and Table 86 in Mat 03.

18.b.iii Where Part 4 is being assessed: Internal finishes, as listed in Table 87 in Mat 03.

18.b.iv Where within scope: Substructure and hard landscaping, as listed in Table 84 in Mat 03.

18.c Transport of construction and demolition waste from the construction gate to waste disposal processing or the recovery centre gate. Monitoring must cover the construction waste groups outlined in the project's waste management plan.

19 Using the collated data, report separately for materials and waste, the total transport-related carbon dioxide emissions ($kgCO_2e$), plus the total distance travelled (km) and amount of fuel used (litres).

One exemplary credit – Responsible construction management

20 Achieve all items in Table 11.

Checklists and tables

The project team will need to complete this checklist as part of the credit for 'Environmental management' (see criterion 5). The assessor and project team must ensure that the intent of each section is met through measures appropriate to the site, which may be different to the examples given here. Areas outside the site boundary with special permission for enabling works should be included.

Table 12: Checklist of measures to minimise air and water pollution during construction works

Section and intent	Examples of actions
1. Pollution prevention planning To allow time to plan and prepare before work begins on site. This can significantly reduce the risk of a pollution incident.	Possible activities to consider before works begin on site: — Review the site and site plans for possible sources of pollution, pollution pathways and vulnerable areas. — Review any environmental information about the site such as ecology reports or site investigation reports and highlight potential issues. This could include site working restrictions relating to noise or deliveries. — Identify: — Potential pollutants — The potential to cause pollution on site. — All interested groups i.e. regulators and neighbours. — Surface waters and ground waters adjacent to the site. — Drainage on site. — Confirm any legislation that applies to the project. — Plan appropriate control measures that are required. — Designate a responsible person to monitor high risk activities and with sufficient authority to prevent them.
2. Noise and vibration Minimise the impact of noise and vibration in the local community.	Measures may include where applicable: — Planning the noisiest activities for times that will result in the least disturbance to the local community. — Putting together a traffic management plan. — Use of barriers or deflectors for impact and blasting activities. — Using plant or machinery with noise controls measures – silencers, mufflers, acoustic covers. — Avoiding or minimising construction transport through community areas, use of one-way traffic to minimise reversing, agreed delivery times.
3. Air quality To prevent dust and other air pollution on site and in the local community.	This may include where applicable: — Minimising dust from materials or waste ensuring these are adequately protected, covered, or damped down.

Section and intent	Examples of actions
	— Reducing dust from vehicle movements through damping down roads, wheel washers, and road sweeping. — Avoiding burning of materials on site. — Ensuring plant and vehicles are regularly maintained and meet necessary exhaust emission standards.
4. Watercourse pollution To prevent water pollution from on-site activities.	This may include where applicable: — Marking up a plan identifying all watercourses and existing drains on site, any existing protection in place or protection measures required to capture, contain, and treat possible contaminants or run-off. — Controls to prevent silt entering watercourses and drains including features such as cut-off trenches or vegetation corridors. — Ensuring fuel, chemical and waste storage areas and activities such as cement mixing or washing out are located away from rivers, boreholes, gullies or other water courses. — Storing all chemicals and hazardous substances in a contained, bunded areas on an impermeable surface and ensuring all containers are free from damage and disposed of correctly. — Training staff on the correct transfer and handling of fuels and chemicals, and emergency procedures. — Providing portable spill containment and clean-up equipment on site and training staff to use it. — Where there is a risk to water quality, carrying out an assessment on the impact on water and developing a water use and protection management plan.

Methodology

M1: Scope of Man 03 Responsible construction

This issue encompasses the responsible management of all activities on site, and relating to the site, from the beginning of demolition to the completion of construction. All criteria detailed in this issue, and the aim of the issue overall, are considered the responsibility of any party who at any stage manages the construction site, e.g. the principal contractor and the demolition contractor, especially when this is not consistent throughout a project.

The exception to this is if the developer or client has taken ownership of a site following completion of demolition, site clearance, or other enabling works. In this case, these works can be excluded from assessment of this issue.

M2: The role of the BREEAM AP

M2.1: Change of BREEAM AP during the project

The BREEAM AP must keep records of targets, reasons behind decisions, any risks and opportunities identified, and any feedback or advice provided to the project team to fully document their involvement. If the person carrying out this role changes during the project, credits may still be awarded provided there has been a robust handover of records and information to a new BREEAM AP and the role is seamlessly maintained in accordance with the criteria.

M2.2: BREEAM AP monitoring construction progress

To monitor the construction progress against the agreed performance targets (see criterion 7.b), the BREEAM AP should ideally be site based. If based elsewhere, they must visit the site sufficiently regularly to monitor activities, carry out spot checks, identify risks of non-compliance and advise on how to address any such shortcomings.

The BREEAM AP must as a minimum visit the site at key stages of the construction process, such as at times when:

— Works can be observed before they are covered up or new works or trades start.

— There are significant risks of conflicts or errors occurring.

— Timing is critical for demonstrating compliance.

— Key evidence is required to be produced at specific times. This includes, but is not limited to, photographic evidence, delivery notes and other documentary evidence.

— Different trades and systems working simultaneously risk harming one another's integrity or compliance in terms of BREEAM requirements.

M3: Responsible construction management – UK and Ireland projects

When demonstrating compliance with the responsible construction management criteria it may be possible to use BREEAM-recognised responsible construction management schemes to support in this process. See Guidance Note 54 (GN54) and definitions for further information.

M4: Transport of construction materials – Data and methodology

To ensure comparability across assessments, the information completed in the BREEAM Platform should be restricted to the minimum data specified.

Recording of data for deliveries to site must include all materials applicable to the scope of works as set out within criteria 18.b.i to 18.b.iv. Records must be available to verify that monitoring has been completed in line with the requirements. Final reporting of the transportation of construction materials figures, such as total carbon dioxide emissions and distance travelled, is to be based on the total figures for all such deliveries. Data for the collection of waste from site must be reported separately to the delivery of materials.

The aim of this requirement is to encourage developers to consider the impacts of transporting products and materials to site. As such, the criteria seek to address only those impacts over which the developer has influence.

In reporting for this issue, the distances travelled by materials must be calculated from the point at which the products or materials were dispatched for the project, whether this is from a builders' merchant or distributor, or direct from the manufacturer. To clarify:

— For products or materials purchased directly from a manufacturer or quarry, the distance must be calculated from the 'factory gate', including any intermediate transport.

— For products or materials, purchased from a merchant or distributor, only the distance from the seller's depot needs to be reported.

Where products cannot be sourced locally, for example on small islands, the transport required to import the materials or products can be discounted, and only the local onward transport to the site need be recorded.

Compliance notes

Ref	Terms	Description
Prerequisite – Health and safety legislation		
CN1	National health and safety regulations and best practice. See criterion 2.	Where there are no national health and safety regulations in the country of assessment, evidence is required to demonstrate that EITHER: — The principal contractor has an occupational health and safety management system compliant with ISO 45001 OR — Works will be carried out in accordance with the International Labour Organisation's (ILO) Safety and Health in Construction Code of Practice.
Environmental management		
CN2	No principal contractor. See criteria 4 and 5.	To achieve compliance where there is no principal contractor, the criteria must be met by the party which fulfils an equivalent role in managing the construction. The intent of this issue is to ensure that the site is managed in accordance with demonstrably sustainable principles by whichever the party has overall control of site management and operations.
CN3	Certificate validity. See criterion 4.	The requirement for the principal contractor to operate an EMS relates to the duration of operations on site. Certification against ISO 14001 or EMAS must be valid at the design stage and post-construction stage submissions and cannot be expired, pending or applied retrospectively.

Ref	Terms	Description
CN4	Timing of obtaining EMS certification. See criterion 4.	The contractor must be in possession of the ISO 14001 or EMAS certification prior to starting works on the development under assessment. This is to ensure that the aim of the issue, to 'encourage construction sites managed in an environmentally sound manner', can be achieved. To uphold the robustness of BREEAM, the date of certification to ISO 14001 or EMAS must be prior to initial works starting on the site.
BREEAM AP		
CN5	Retrospectively applying AP status. See criterion 7.	The AP status cannot be applied retrospectively. The purpose of using an AP on a project is so that they can influence and maximise the development the BREEAM and sustainability performance of the project for the least cost/risk. If the AP is not appointed and involved from at least the beginning of work on site, and preferably in the planning of such work, then the aims and criteria of this BREEAM issue are not being met.
CN6	BREEAM Assessor as the BREEAM AP. See criterion 7.	Where an assessor holds current and applicable AP credentials, the same individual can be appointed as both BREEAM Assessor and BREEAM AP for the project. In such cases, it must be made clear when submitting the assessment that both roles are, or were, being carried out by the same person and explained in writing how potential conflicts of interest have been identified and managed.
Responsible construction management		
CN7	Compliance with responsible construction management items. See criteria 9, 10, 20.	In instances where items in Table 11 are not relevant due to the project scope of works on site, the assessor should clearly justify and robustly demonstrate the project is compliant without these items having been achieved.
General		
CN8	Change in principal contractor	If the principal contractor changes mid-project, for example where the original contractor goes into administration and is replaced, it is acceptable for the post-construction credits to be based on the activities of the new contractor providing these are monitored and recorded from before work on site commences. However, if the project has already started on site and information about the site activities of the previous contractor is not available the relevant credits must be withheld. In such instances, where appropriate justification is provided, the prerequisites or minimum standards may be waived. For example, the prerequisite 'Legally harvested and traded timber' is achievable with incomplete evidence provided that the client demonstrates appropriate efforts to obtain the required evidence, together with the following: — Evidence of the company going into administration. — All evidence of compliance that was provided from the company in administration, where available. — Evidence of compliance from the date a new company was engaged.
CN9	Multiple contractors on the same project	The aim of this issue is that the construction site complies with BREEAM criteria rather than any specific contractor. Several different contractors may have obligations to meet compliance criteria. One of the contractors and/or site managers may have responsibility for ensuring compliance during site operations. It is ultimately the client/project team's responsibility to determine and demonstrate compliance.

Evidence

Criteria	Interim design stage	Final post-construction stage
Prerequisite – Legally harvested and traded site timber		
1	Relevant section or clauses of the building specification or contract.	Confirmation of all temporary site timber used and for what purpose.

Criteria	Interim design stage	Final post-construction stage
	OR A signed and dated letter of commitment to meet the relevant criteria.	Where certified materials were used, copies of all relevant certificates or chain of custody evidence. Robust post-construction evidence to verify proof of purchase such as delivery tickets, invoices, purchase orders, confirmation from suppliers or site photographs.
Prerequisite – Health and safety legislation		
2	Relevant section or clauses of the building specification or contract. OR A signed and dated letter of commitment to meet the relevant criteria.	Confirmation of the national H&S legislation and regulations that have been followed. AND Supporting documentation such as designer risk assessments, construction environmental management plans, site procedures and site plans, site records, on-site health and safety monitoring.
Environmental management		
4	Relevant section or clauses of the building specification or contract. OR A signed and dated letter of commitment to meet the relevant criteria. OR A copy of the principal contractor's EMS/EMAS certificate, where contractor is appointed.	A copy of the principal contractor's EMS/EMAS certificate.
5	Relevant section or clauses of the building specification or contract. OR A signed and dated letter of commitment to meet the relevant criteria. OR A copy of the checklist (Table 12 on page 63) and supporting evidence confirming the proposed measures and procedures against each section.	A copy of the checklist (Table 12 on page 63) confirming how each section has been addressed by the referenced evidence. Evidence to support that procedures and policies for pollution prevention management were in place and implemented such as construction environmental management plans, site procedures, site plans, site records and site photographs.
BREEAM AP		
6, 8	Relevant section or clauses of the building specification, contract documents or formal agreement stating the required BREEAM performance rating.	No further actions required post-construction other than the Assessor's report to demonstrate that the performance rating has been achieved.
7	Relevant section or clauses of the building specification or contract. OR A signed and dated letter of commitment to meet the relevant criteria.	Evidence to confirm the appointment of the BREEAM AP, when it took place, and confirming their AP status. Supporting evidence such as reports, correspondence and meeting minutes to verify their ongoing involvement in the project and attendance on site and at relevant project team meetings.
Responsible construction management		
9, 10, 20	Relevant section or clauses of the building specification or contract. OR	Supporting evidence such as site plans, procedures or policies, site inspection reports or photographs, site records or letters.

Criteria	Interim design stage	Final post-construction stage
	A signed and dated letter of commitment to meet the relevant criteria. Note: It must be clear which responsible construction management items within Table 11 are being targeted.	Where applicable, evidence to support registration prior to commencement on site, CCS certificate, and monitor's final report. Note: it must be confirmed how each point in Table 11 has been evidenced (except where met by CCS certification).
Site monitoring		
11 to 19	Confirmation of the targets that have been set for the project. Details of the predicted project value. AND Relevant section or clauses of the building specification or contract. OR A signed and dated letter of commitment to meet the relevant criteria.	Name of the individual appointed for monitoring, recording and reporting site data. Confirmation of the final project value. Monitoring records showing collated construction phase data including: — Total site energy consumption. — Total site net water consumption. — For both materials and waste, the total transport-related carbon dioxide emissions plus total distance travelled and fuel consumption. — Evidence to validate figures provided such as photos of meter readings or invoices.
EU Taxonomy		
Additional requirements to those listed against criteria 5, 9, and 10		Where compliance is demonstrated for criteria 9 and 10 using the Considerate Constructors Scheme, additional evidence may be required to show how items d and e have been met for EU taxonomy, if not covered within the Monitor's Report.

Definitions

BREEAM Advisory Professional (AP)

An individual trained and qualified by BRE as a specialist in built environment sustainability, environmental design and assessment. The role of the BREEAM AP is to provide advice as needed and 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. Only qualified individuals who are members of BRE's associated membership scheme comply with the BREEAM requirements. This membership ensures an adequate level of competence is maintained through regular continuing professional development (CPD) in key relevant areas. For a list and contact details of BREEAM APs, visit: www.greenbooklive.com.

The assessor must ensure that the BREEAM AP qualification was valid at the time of appointment and maintained throughout their involvement in the relevant project stages.

The AP does not need to be the same person as appointed under Man 01.

BREEAM AP Operations (US) only cover the in-use phase of BREEAM and are not compliant for this issue.

BREEAM-recognised responsible construction management schemes

These are third-party schemes evaluated by BRE Global for recognition under BREEAM. For further guidance on recognised schemes and the way in which they support compliance with these BREEAM criteria, see Guidance Note 54 (GN54).

This is a list of existing schemes that we are currently aware of that may support the achievement of the responsible construction management criteria:

- **Considerate Constructors Scheme:** The Considerate Constructors Scheme (CCS) is a national initiative set up by the UK construction industry to improve its image. The scheme is a self-financing, independent organisation owned by the Construction Umbrella Bodies (Holdings) Ltd (made up of the Construction Products Association and the Construction Industry Council). Sites and companies that register with the scheme sign up and are monitored against a Code of Considerate Practice, designed to encourage best practice beyond statutory requirements.
- **Fleet Operator Recognition Scheme:** The Fleet Operator Recognition Scheme (FORS) is a voluntary UK accreditation scheme that promotes best practice for commercial vehicle operators. FORS encompasses all aspects of safety, efficiency, and environmental protection by encouraging and training fleet operators to measure, monitor and improve performance. FORS provides accreditation pathways for operators of any type, and for those organisations that award contracts and specify transport requirements

Construction process

The construction process includes the enabling works, assembly, installation and disassembly activities necessary for servicing the construction and completion of a new building.

Dedicated off-site manufacturing or fabrication

Production of a component or material carried out in an off-site manufacturing or processing facility specifically set up for a development project. This excludes manufacturing from 'off the shelf' products.

Development footprint

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

Exhaust emission standards

This may include demonstrating that the following standards are being met. Where there are local authority or national guidelines in place, these may be used instead.

- Non-Road Mobile Machinery (NRMM) Regulation (EU) 2016/1628.
- For road going vehicles: Euro emission standards (Euro 1 to 7).

Formally agreed

The term 'formally agreed' relates to BREEAM performance targets. Examples of formal agreements include:

- Contract documentation or letters of appointment between the Client and Contractor.
- Meeting minutes dated at the appropriate project stage, where the Contractor is present and the rating has been confirmed as a client requirement.
- Evidence that the BREEAM rating is a planning requirement.

Performance targets

BREEAM performance targets refer specifically to the BREEAM rating and minimum standards required. This does not necessarily include individual targeted BREEAM issues or credits, which may be traded over the course of the project as it evolves. In agreeing a BREEAM target, it is recommended that individual BREEAM issues, credits and criteria are targeted or prioritised. This is to ensure that the agreed target is achievable and achieved without potentially costly alterations to the design at a later stage. Only the overall BREEAM rating is required to be targeted (e.g. Excellent) and not a specific percentage score.

Point of supply

For the purposes of this issue, point of supply is the point from which the product was supplied to the site. This may be the factory gate or the distribution centre, depending on the product type.

The factory gate is defined as the product manufacturer's gate (i.e. where manufacture and pre-assembly finishes and the material is in its final product form). Examples might include:

- Steel, concrete or glass manufacturers for cladding, windows and beams etc.
- Quarry gate for aggregate and sand.
- Concrete plant for concrete.

Principal contractor

The company that has overall responsibility for overseeing the construction stage of the project, whether that is a contractor or managing agent.

Project value

The term 'project value' represents the total project cost, which includes all costs such as construction, design, land acquisition, etc.

Relevant stakeholders

These can include design team, main contractor, sub-contractors, specialist contractors, and manufacturers.

Small-scale projects

For the purposes of this issue, small-scale projects are defined as projects up to 500 m² gross internal floor area.

Small-scale projects may follow full requirements where preferred.

Timber – including legally harvested and traded; recycled / reclaimed

Legally harvested and traded timber

For all countries except UK:

Legally harvested timber and wood-derived products are those that originate from a forest where the following criteria are met:

1. The forest owner or 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 and safety.
    e. Other parties' tenure and use rights.
    f. All relevant royalties and taxes are paid.
3. There is full compliance with the criteria of CITES.

Legally traded means timber or products derived from Legally harvested timber were:

1. Exported in compliance with exporting country laws governing the export of timber and timber products, including payment of any export taxes, duties or levies.
2. Imported in compliance with importing country laws governing the import of timber and timber products, including payment of any import taxes, duties or levies.
3. Traded in compliance with legislation related to the convention on international trade in endangered species (CITES), where applicable.

For UK projects:

BREEAM follows the UK government's definition of legal and sustainable timber, as outlined in the Central Point of Timber (CPET) 5th Edition of the UK Government Timber Procurement Policy (TPP). At the time of writing, the policy requires all timber and wood-based products to be covered by at least one of the following (but the webpage below should be checked for changes):

1. Third party, independent forest certification schemes – Category A (e.g. FSC or PEFC).
2. Evidence on a case-by-case basis in line with the Framework for Evaluating Category B evidence – Category B.

For the avoidance of doubt, 100% of the timber and timber-based products must be compliant.

Further information on the UK Government's TPP and compliant responsible sourcing certification schemes is available from: www.gov.uk/guidance/timber-procurement-policy-tpp-prove-legality-and-sustainablity.

For projects in USA and Canada:

Compliance with the prerequisite can be demonstrated using the ASTM D7612-21 standard.

Examples of legally harvested and traded timber

The following examples are considered compliant for the purpose of BREEAM:

Evidence type	Demonstrates timber is legally harvested	Demonstrates timber is legally traded
Compliance with CPET (timber bought inside the UK only).	Yes	Yes
FSC, PEFC or SFI certification (this includes products labelled FSC Mix or PEFC mixed sources).	Yes	Yes
Evidence of compliance with the EUTR (timber bought inside the EU only).	Yes	No
Risk assessment/due diligence documentation demonstrating a low risk of non-compliance with the 'legally harvested' requirements.	Yes	No
Risk assessment/due diligence documentation demonstrating a low risk of non-compliance with the 'legally traded' requirements.	No	Yes

Products labelled as FSC Controlled Wood only minimise the risk that wood comes from illegal or controversial sources and does not eliminate the risk fully. Therefore, products labelled as such do not meet the prerequisite for legally harvested and traded timber.

Timber that is being reused and can be verified as such, for example old timber formwork, can be excluded from the requirements. The criteria only applies to new formwork or scaffolding boards or any other new temporary site timber products purchased for the project, not that which is being reused.

Recycled / reclaimed timber

This is recovered wood that prior to being supplied to the project had an end use as a standalone object or part of a structure that has completed its lifecycle, and which would otherwise be disposed of as waste. The term covers the following categories:

- Pre-consumer recycled wood and wood fibre or industrial by products but excluding sawmill co-products (sawmill co-products are deemed to fall within the category of virgin timber).
- Post-consumer recycled wood and wood fibre.
- Driftwood.

The term "recycled" also covers reclaimed timber that was abandoned or confiscated at least ten years previously.

Training

For the purposes of this issue, appropriate training can mean teaching, or developing for oneself or others, areas of skill and knowledge relating to relevant competencies (e.g. manual handling, safe working practices, regulations, project management, vocational skills, site supervision).

Training includes, but is not limited to:

1. Formal external training.
2. On site learning from trained or experienced people.
3. Provision of training material or instructions for carrying out tasks.

Additional information

Health and safety legislation

For U.S. - Occupational Safety and Health Administration (www.osha.gov/construction/)

OSHA's mission is to assure America's workers have safe and healthful working conditions free from unlawful retaliation. OSHA carries out its mission by setting and enforcing standards; enforcing anti-retaliation provisions of the OSH Act and other federal whistleblower laws; providing and supporting training, outreach, education, and assistance; and ensuring state OSHA programs are at least as effective as federal OSHA, furthering a national system of worker safety and health protections.

Where states have their own OSHA approved State Plans or Hybrid Federal-State Plans which include more stringent safety requirements, these must also be met.

Examples of evidence for BREEAM AP criteria

Examples of evidence that could be used to demonstrate compliance with some of the requirements of the BREEAM AP related criteria include, but are not limited to the following:

- Meetings minutes, communication records, formal notes of conversations and other statements reporting on discussions related to performance targets and maximising performance.
- Risks and opportunities documentation.

Examples of evidence for responsible construction

Examples of evidence that satisfy criteria 9 to 11 include, but are not limited to the following:

- Company's policy and procedure documents (including environmental management, pollution prevention, security).
- Construction logistics plan.
- Responsibility matrix.
- Training records.
- Photographic evidence.
- Records of communication with the neighbouring community. For example: letters, newsletters and campaigns.
- Contracts or formal agreements – Reporting documents and logs.
- Reporting procedures.
- Records of improvements and of no complaints.
- Lessons learned.
- Evidence produced by third-party schemes. For example: Considerate Constructors Scheme (CCS) monitor's report, Fleet Operators Recognition Scheme (FORS), Construction Logistics and Community Safety (CLOCS), BRE Yellow Jacket documentation.

CO_2 reporting protocols

At the time of publication, the following guidance is available for CO_2 measuring protocols.

1. Encord (www.encord.org)
2. GHG Protocol (www.ghgprotocol.org)
3. For UK: Defra guidance for business (www.gov.uk/guidance/measuring-and-reporting-environmental-impacts-guidance-for-businesses)

Conversion factors in national regulations may be used where available.

Tools for monitoring and targeting construction site impacts

SmartWaste is an online environmental reporting tool for the construction industry. It enables organisations to efficiently capture, monitor and report on:

- Waste (including Site Waste Management Plans & Pre-Demolition Audits).
- Energy (including conversion to carbon dioxide emissions).
- Water.
- Responsibly sourced materials (including timber).
- Transport.
- Considerate Contractors Scheme.

Used to meet the criteria of this issue and as a source of evidence for demonstrating compliance, SmartWaste helps organisations to reduce their environmental impacts, making substantial time and cost savings.

More information about SmartWaste can be found at: www.smartwaste.co.uk.

The International Finance Corporation provides information relating to this issue - see the IFC World Bank Group Environmental, Health and Safety (EHS) Guidelines.

The value of the BREEAM AP

The BREEAM AP can be called on and provide BREEAM and general sustainability design and construction expertise and advice to design teams, specifiers, constructors and other key stakeholders. This will inform decision-making and therefore identify opportunities to maximise performance and work towards a targeted rating in the most cost-effective, timely and solutions orientated way.

The BREEAM AP will coordinate and work with the BREEAM Assessor to ensure an efficient and smooth assessment process, aiming to maximise the performance of the assessed project.

Tools and schemes for responsible construction management

Other tools and schemes can contribute to achieving the credits for responsible construction management, including the Considerate Constructors Scheme and Fleet Operator Recognition Scheme. For more information, see Guidance Note 54 (GN54).

Man 04 Commissioning and handover

(all buildings)

Aim

To encourage a properly planned handover and commissioning process that reflects the needs of the building occupants.

Overview

Assessment type	Credits available	Minimum standards	Applicable assessment criteria
Part 1: Fabric and structure	1	None	9 and 10 (see ref 2.0)
Part 2: Core services	3	Very Good	1–7 and 11–12 (see ref 1.0, 1.1, and 2.0)
Part 3: Local services	3	Very Good	1–7 and 11–12 (see ref 1.0, 1.1, and 2.0)
Part 4: Interior design	3	Very Good	1–7 and 11–12 (see ref 1.2 and 2.0)

Assessment type specific notes

Ref	Assessment type specific note
1.0	**Part 2: Core services and Part 3: Local services** The requirements for 'Schedule and responsibilities' (criteria 1 to 5) and 'Commissioning role' (criteria 6 and 7) apply to the scope of services being specified or installed.
1.1	**Part 2: Core services and Part 3: Local services – Guides and training schedules** The user guides and training schedules include, as far as possible, all relevant sections regarding the services and fabric installed. On completion of works the building owner, agent or user hands it over to the fit-out contractor, who can then complete the relevant sections based on the fit-out strategy.
1.2	**Part 4: Interior design** Where the fit-out includes equipment, such as display lighting and display chillers or freezers, these will need to be commissioned in accordance with the manufacturer's requirements.

Building type specific notes

Ref	Building type specific note
2.0	**Small-scale projects** For small-scale projects, only the requirements for 'Schedule and responsibilities (criteria 1 to 5) and 'Handover' (criteria 11 and 12) are applicable.

Assessment criteria

One credit – Schedule and responsibilities

1 Prepare a schedule of commissioning and testing. The schedule identifies and includes a suitable timescale for commissioning and re-commissioning of all complex and non-complex building services and control systems and for testing and inspecting building fabric.

2 The schedule must identify the appropriate standards that all commissioning activities will be conducted in accordance with (see M1).

Any industrial process or manufacturing-related equipment specified as part of the project can be excluded from the assessment, except where it forms an integral part of building services, such as some heat recovery systems or cold storage systems as defined in Ene 06.

3 Where a building management system (BMS) is specified:

3.a Carry out commissioning of air and water systems when all control devices are installed, wired, and functional.

3.b Include physical measurements of room temperatures, off-coil temperatures and other key parameters, as appropriate, in commissioning results.

3.c The BMS or controls installation should be running in auto with satisfactory internal conditions prior to handover.

3.d All BMS schematics and graphics (if BMS is present) are fully installed and functional to user interface prior to handover.

3.e Fully train the occupier or facilities team in the operation of the system.

4 Appoint an appropriate project team member to monitor and programme pre-commissioning, commissioning and testing. Where necessary include re-commissioning activities on behalf of the client.

5 The principal contractor accounts for the commissioning and testing programme, responsibilities and criteria within their budget and the main programme of works. The programme shall allow for the required time to complete all commissioning and testing activities prior to handover.

One credit – Commissioning role

6 Achieve the schedule and responsibilities credit (criteria 1 to 5).

7 During the initial design stages (prior to commencement of any technical design), the client or principal contractor appoint a specialist commissioning manager who will be responsible for:

7.a Holding a commissioning workshop to:

7.a.i Establish the commissioning requirements and related success criteria.

7.a.ii Determine the commissioning scope such as what building systems need to be commissioned, any interfaces required, what commissioning activities will need to take place at each project stage and what is the standard of commissioning required.

7.a.iii Agree on the commissioning budget required for each phase of the project.

7.a.iv Review commissioning lessons learned from previous projects.

7.b Developing a design stage Commissioning Plan. This initial plan and schedule will be developed further through the later projects stages and finalised through the construction phase. The plan must define:

7.b.i The commissioning process, identifying the project-specific commissioning tasks to be executed at the different stages of delivery.

7.b.ii Commissioning roles and responsibilities. Including any specialist sub-contractors.

7.b.iii The commissioning schedule, sequencing the commissioning events and associated dates and durations.

7.c Undertaking commissionability reviews to provide advice that helps streamline the commissioning process and identify any potential issues particularly in relation to interfaces between systems.

7.d Production of the Commissioning Specification – *This document will generally be produced by the project's consulting engineers with input from the commissioning manager and will set out the technical system performance requirements and test procedures.*

7.e Ensuring the production of Commissioning Methodologies during the construction stage – *These will typically be developed by the specialist sub-contractors for each system and checked by the commissioning manager. The commissioning manager will need to produce the integrated systems test (ISTs) methodologies (where applicable).*

7.f Managing the commissioning process throughout the project and the performance testing at handover or post-handover stages.

For buildings, which do not have complex building services or systems, this role can be carried out by a non-specialist commissioning manager.

One credit – Envelope testing

8 Achieve the schedule and responsibilities credit, where applicable (criteria 1 to 5).

9 Complete post-construction testing and inspection to quality-assure the integrity of the building fabric, including continuity of insulation, avoidance of thermal bridging and air leakage paths. This will be met by completing both airtightness testing and a thermographic survey (see M2), carried out by a suitably qualified professional in accordance with the appropriate standard (see M2.5).

10 Rectify any defects identified during post-construction testing and inspection prior to building handover and close out. Any remedial work must meet the required performance characteristics for the building or element as defined at the design stage (see M2.4).

One credit – Handover

11 Prior to handover, develop two building user guides (see M3) for the following users:

11.a A non-technical user guide for distribution to the building occupiers.

11.b A technical user guide for the premises facilities managers.

A draft copy is developed and discussed with users first (where the building occupants are known) to ensure the guide is most appropriate and useful to potential users.

12 Prepare two training schedules (see M4) timed appropriately around handover and proposed occupation plans for the following users:

12.a A non-technical training schedule for the building occupiers.

12.b A technical training schedule for the premises facilities managers.

Methodology

M1: Commissioning standards

M1.1: Projects in all countries except UK

Please refer to the Approved Standards List to locate the appropriate national building regulations and best practice commissioning codes in the county of assessment. Alternatively, please demonstrate that the minimum requirements as set out in the Approved Standards List are covered by the proposed documents. Clear referencing must be used to show how the Approved Standards List has been used to confirm compliance.

Where appropriate commissioning codes do not exist for a country, the design team should demonstrate compliance with the UK or European standards as listed in each relevant country reference sheet.

M1.2: UK projects

The appropriate standards for all commissioning activities will include, where applicable:

1. Current Building Regulations
2. BSRIA guidelines
3. CIBSE guidelines
    - Commissioning Code A: Air distribution systems. CIBSE; 2024.
    - Commissioning Code B: Boilers. CIBSE; 2002.
    - Commissioning Code C: Automatic Controls. CIBSE; 2001.
    - Commissioning Code L: Lighting. CIBSE; 2018.
    - Commissioning Code M: Commissioning Management. CIBSE; 2022.
    - Commissioning Code R: Refrigerating Systems. CIBSE; 2002.
    - Commissioning Code W: Water Distribution Systems. CIBSE; 2025.
4. Other appropriate standards such as:

a. Building fabric:

- ISO 6781-1:2023 Performance of buildings – Detection of heat, air and moisture irregularities in buildings by infrared methods – Part 1: General procedures.
- BS EN ISO 9972:2015 Thermal performance of buildings – Determination of air permeability of buildings – Fan pressurisation method.

M2: Envelope testing

M2.1: Scope of the envelope testing

The scope of the testing and inspecting building fabric credit is limited to those areas where the fabric of the building is being upgraded as part of the works. Where this is the case, the criteria only apply to the upgraded areas.

Testing of upgraded areas only can only be applied where accurate results can be achieved. If accurate results are not possible through only testing the upgraded areas (for instance, as a result of adjoining existing spaces affecting airtightness), testing of the overall building would be required to achieve the credit. It is acceptable to apply this principle separately for the two tests, for example: completing a partial thermographic survey to upgraded areas only and a full building air tightness test.

Where the assessment includes an extension, all new build areas will be subject to envelope testing.

M2.2: Large complex buildings

In the case of large and complex buildings, it may be impractical for the thermographic survey to cover 100% of the building, or areas subject to testing in line with M2.1. Where a complete thermographic survey or airtightness testing is deemed impractical by a suitably qualified professional (thermographic survey or airtightness testing), the following guidance applies:

- **Airtightness testing:** Guidance in airtightness standard ISO 9972:2015 (or relevant local standard) must be followed regarding the extent of the survey and testing. This could include, for example, airports, large hospitals, high-rise buildings. Air testing of the entire assessed area, or all upgraded areas, is required. Where a uniform air pressure is unable to be achieved by air testing in a single test, then the assessed building areas can be split into zones and tested individually however, ultimately all parts of the building must be tested and the results compounded to provide an overall air tightness result. Sample testing is not compliant. ATTMA TSL3: 2021 provides guidance on testing complicated building in zones.
- **Thermographic survey:** Where the envelope of the entire assessed building is being upgraded, any building which has a floor area less than 2000 m² must have a full survey. Any new extension which has a floor area less than 2000 m² must undergo a full survey. Any applicable building parts which require testing, with a floor area greater than or equal to 2000 m², may be sampled by taking images of a representative sample of spaces on each floor, including spaces with different activities and at different locations on the floor plan. Sampling must be based on a rate of at least 20% of each similar room type internally, but external imaging must cover 100% of the façade area. Each elevation and each elevational and roof treatment/type, including junctions between constructions and corners, need to be sampled. Sampling should be increased if evidence of poor building fabric thermal performance is identified from sampling. The thermographer must declare any limitations on the survey caused by sampling and identify areas which were not able to be tested, with justification as to why it was not feasible.

M2.3: Part 1 only (shell only) assessments

For Part 1 only (shell only) assessments with spaces which are intended to be treated post-assessment, imposing the requirement for a thermographic survey on a future user is not acceptable, as it may be difficult and unreasonable to expect them to remediate any defects revealed by the survey. Therefore, the credit is still applicable even if building services have not yet been fitted. For air leakage, early testing can also be valuable in identifying potential issues and areas of poor workmanship before they are sealed away, allowing access for remediation where required.

M2.4: Remediation work

Any remediation work undertaken, resulting from a thermographic survey and airtightness test of the building, must be robust and durable, i.e. the remedial work must have the same performance characteristics and life expectancy of the surrounding elements.

Where anomalies are confirmed by the thermographer to be minor, the contractor may investigate and remediate where required and document any actions within a short report, including photographic evidence, to verify that measures have been implemented. Where thermographer confirms the anomalies to be more significant, a further thermographic survey will be

required to prove the remedial works. Where appropriate, this may just be a localised retest to any areas which were identified as having defects.

M2.5: Appropriate standards

Air tightness testing

- **Generally:** ISO 9972:2015 Thermal performance of buildings — Determination of air permeability of buildings — Fan pressurization method.
- **For UK:** Additionally, the testing methodology as set out within the applicable Air Tightness Testing and Measurement Association (ATTMA) Technical Standards should be followed:
    - TSL1: Measuring Air Permeability in the Envelopes of Simple Buildings Fan Pressurisation Method, Issue 4 September 2021
    - TSL2: Measuring Air Permeability in the Envelopes of Non-Simple Buildings Fan Pressurisation Method, Issue 2 September 2021
    - TSL3: Measuring Air Permeability in the Envelopes of Complex Buildings Fan Pressurisation Method, Issue 1 September 2021
    - TSL4: Measuring Air Permeability in Passivhaus and Low Energy Buildings Fan Pressurisation Method, Issue 2.0.1 June 2023
- **For USA:** ASTM E779-19 Standard Test Method for Determining Air Leakage Rate by Fan Pressurization.

Thermographic survey

- ISO 6781-1:2023 Performance of buildings - Detection of heat, air and moisture irregularities in buildings by infrared methods Part 1: General procedures.
- ISO 6781-3:2015 Performance of buildings - Detection of heat, air and moisture irregularities in buildings by infrared methods Part 3: Qualifications of equipment operators, data analysts and report writers.

M3: Building user guides

The building user guides shall be building-specific or site-specific guidance. The purpose of the guides is to help building users access, understand and operate the building efficiently and in accordance with the original design intent. The content of the guides is specific to the building type and end users and the extent will depend on the scope of works, but broadly must include information on the following (where relevant):

1. Overview of the building and its environmental strategy, e.g. energy or water efficiency policy or strategy, and how users should engage with and deliver the policy or strategy.
2. Waste and recycling strategy, including location of facilities.
3. Provision of, and access to, shared facilities.
4. Safety and emergency information or instructions.
5. Building-related operational procedures specific to building type or operation, e.g. laboratories.
6. Building-related incident reporting and feedback arrangements.
7. Provision of and access to transportation facilities, e.g. public transport, cyclist facilities, pedestrian routes etc.
8. Provision of and access to local amenities.
9. Links, references and relevant contact details.

Additionally, for the non-technical building user guide for building occupiers:

1. Building services overview and how to access building occupant controls, e.g. where to find them, what they control, how to operate them effectively and efficiently etc. The guide should avoid jargon and contain simple and clear, easy-to-follow instructions on all controls relevant to the general building user such as local heating, lighting, or blinds.
2. Pre-arrival information for visitors, e.g. access and security procedures or provisions.

Additionally, for the technical building user guide for facilities managers:

1. Building services overview and access to facilities management controls, e.g. where to find them, what they control, how to operate effectively and efficiently etc.
2. Details on energy and water metering and monitoring strategies, including targets.
3. Refit, refurbishment and maintenance arrangements or considerations.
4. Building related training information or links.

The building user guide for building occupiers must be written clearly and provide easily accessible and understandable information relevant to the building's staff (or where relevant residents) and to other building users, e.g. visitors or community users.

The building user guide for facilities managers can use more technical language if appropriate and provide understandable information relevant to the professionals managing the building facilities. This guide could be part of the operations and maintenance (O&M) manual.

There is no requirement on the format the building user guide should take.

M4: Training schedule

The training schedules only need to cover those services installed as part of the scope of works and shall include the following as a minimum:

— The building's design intent.

Additionally, for the building occupiers' training schedule:

— Introduction to the non-technical building user guide for building occupiers and other relevant building documentation.

Additionally, for the facilities managers' training schedule:

— The available aftercare provision and aftercare team main contacts, including any scheduled commissioning and post occupancy evaluation.

— Introduction to, and demonstration of, installed systems and key features, particularly building management systems, controls and their interfaces.

— Introduction to the technical building user guide for facilities managers' and other relevant building documentation, e.g. design data, technical guides, maintenance strategy, operations and maintenance (O&M) manual, commissioning records, logbook etc.

— Maintenance requirements, including any maintenance contracts and regimes in place.

For speculative developments where the end user is unknown, the training schedules must still be provided; and either a contract to provide future training to end users or evidence that relevant training has been provided to the building owner or a building or facilities manager.

Compliance notes

Ref	Terms	Description
Schedule and responsibilities, commissioning role		
CN1	Monitor and specialist commissioning manager	The commissioning monitor is typically a project team member who will monitor the systems commissioning and testing programme for the building. The individual may combine that role with that of the specialist commissioning manager to deal with complex systems if they have the necessary knowledge. For the 'Commissioning role' credit, whilst a single commissioning manager will be appointed to lead the process, there will likely be involvement and input from manufacturers or specialist subcontractors, who will form part of a commissioning team.
Envelope testing		

Ref	Terms	Description
CN2	Fabric testing and inspection in hot climates	The requirements for thermographic survey and air tightness testing are applicable to both, cold and hot climates. A suitably qualified professional will advise on the appropriate testing conditions and specific methods to address this issue in different climatic conditions. Building fabric air tightness is important in different climates to ensure than no additional energy is consumed due to increased heating or cooling demand originating from the lack of integrity of the building fabric.
CN3	Thermographic survey – Seasonal constraints	Thermographic surveys are designed to map the thermal efficiency of buildings and to detect areas where there are breaches in the thermal envelope. The conditions required to undertake a thermal imaging survey are vital in order to achieve an accurate picture of the thermal performance of the building. These are summarised below: 1. No significant changes in external temperature during the 24 hours before the survey. 2. A temperature difference between inside the property and outside of at least 10°C during the survey. 3. No sun shining directly onto the external walls of the property during the survey, and no residual solar load from prior sun (this can take many hours to dissipate dependent on construction and building orientation/location). 4. No rain or high winds during the survey. Vertical surfaces should be dry. Where seasonal constraints prevent the thermographic survey from being completed prior to certification at the post construction stage, the requirements can be satisfied with: — Evidence that a suitably qualified professional (SQP) has been contractually appointed. — Written confirmation by the SQP that the seasonal constraints prevent the survey at an appropriate time before certification. — The survey is scheduled to take place at the earliest opportunity after the handover. — There is a specific contractual agreement in place to remedy any identified defects before the defects liability period expires.

Evidence

Criteria	Interim design stage	Final post-construction stage
Schedule and responsibilities		
1–4	Relevant section or clauses of the building specification or contract. OR A letter of commitment from the client or developer. AND Commissioning schedule (where available).	Commissioning schedule identifying commissioning standards followed and evidence to verify that commissioning was carried out in line with these. BMS commissioning records or procedures. Confirmation of appointment of appropriate project team member.
5	Copy of the principal contractor's programme and project budget showing commissioning allowances. OR Where contractor not yet appointed: Relevant section or clauses of the building specification or contract. OR	Copy of the principal contractor's programme and project budget showing commissioning allowances.

Criteria	Interim design stage	Final post-construction stage
	A letter of commitment from the client or developer.	
Commissioning role		
7	Letter of appointment for commissioning manager(s). Minutes of commissioning workshop. Commissioning plan, schedule, specification and methodologies. Evidence of design reviews (where available). Where applicable, evidence that the specialist commissioning manager meets the definition for this role.	Copies of design reviews and commissioning records and reports (copies of all certificates are not required). Finalised commissioning plan, schedule, specification and methodologies. Where applicable, evidence that the specialist commissioning manager meets the definition for this role.
Envelope testing		
9–10	Relevant section or clauses of the building specification or contract. OR A letter of commitment from the client or developer.	Thermographic survey and air leakage report. Qualifications/certificates for suitably qualified professionals. This could include up-to-date screenshots showing live status from approved scheme websites such as ATTMA. Verification that remedial works have been completed where required.
Handover		
11–12	Relevant section or clauses of the building specification or contract. OR A letter of commitment from the client or developer which is specific for the project being assessed. OR Draft building user guides and training schedule, where available.	A copy of the building user guides. Written confirmation from the design team or client that the guide has been, or will be, distributed to the building's owner, tenants or fit-out contractor (for completion), as appropriate. Copy of the training schedules, with confirmation that it was issued to the relevant people at the required time and that training was carried out in line with the schedules.

Definitions

Complex systems

These include, but are not limited to, air-conditioning, comfort cooling, mechanical ventilation, displacement ventilation, complex passive ventilation, BMS, renewable energy sources, cold storage enclosures and refrigeration plant.

Small-scale projects

For the purposes of this issue, small-scale projects are defined as projects up to 500 m² gross internal floor area.

Small-scale projects may follow full requirements where preferred.

Specialist commissioning manager

An individual will meet the requirements of a specialist commissioning manager where:

1. They hold a recognised qualification for commissioning management and/or degree in mechanical, electrical or building services engineering or related field.
2. Have acquired substantial expertise through a minimum of three years relevant experience (within the last five years) in the building services industry, with a focus of mechanical and electrical commissioning.

Those accredited to a level of Senior Commissioning Manager under The Commissioning Specialists' Association (CSA) OR holding ASHRAE Building Commissioning Professional certification (BCxP) will be deemed to be specialist commissioning managers.

The commissioning manager must be independent from both those producing the design, and those involved in the installation works.

In principle, it is possible for the specialist commissioning manager to be from the same organisation as the main contractor provided any conflicts of interest have been declared and records show how they have been managed to provide confidence that commissioning will be carried out appropriately.

The separate roles of the main contractor and specialist commissioning manager are so that the installation and commissioning are carried out independently by different parties.

Suitably qualified professional – Airtightness testing

Professionals of organisations accredited to ISO 17025 for building air leakage testing by a national accreditation body for buildings and test standards included within the scope of their accreditation, or members of a nationally recognised competent person scheme to the relevant level for the building as defined by the scheme. e.g. Air Tightness Testing and Measurement Association (ATTMA) or Elmhurst Airtightness Scheme (EAS).

Suitably qualified professional – Thermographic survey

Professionals holding a valid Category II in thermography, as defined by ISO 18436-7:2014 or Class II in infrared thermography as defined by ISO 6781-3:2015.

Where a Class/Category II thermographer is not available at the site, the survey may be undertaken by a Class/Category I thermographer and then the images interpreted by a Class/Category II thermographer. The Class I thermographer must follow a written procedural methodology for the field investigation, developed by the Class II thermographer for the specific building being investigated.

Thermal bridge

A thermal bridge (sometimes referred to as thermal bridging, a cold bridge or thermal bypass) describes a situation in a building where there is a direct connection between the inside and outside through one or more elements that are more thermally conductive than the rest of the building envelope.

Additional information

Thermal bridging assessments

It is good practice to carry out thermal bridging assessments at the design stage. This is encouraged through building regulations for energy conservation by allowing the use of actual values in the energy calculation, which could make a significant improvement over using the default values in the National Calculation Methodology. This is reflected in Ene 01 Energy and carbon performance for regulated energy uses, so no additional credit is offered within this issue for thermal bridging assessments. However, good thermal bridging design and assessment will contribute to successful building fabric testing results and the associated credit.

Useful guidance

- Barker, K. Commissioning Air Systems (BG 49/2024), BSRIA; 2024.
- Hawkins G. Commissioning Job Book - A framework for managing the commissioning process (BG 11/2010). BSRIA; 2010.
- Lowry, M. Commissioning Responsibilities Framework (BG 88/2025), BSRIA; 2025.
- Parsloe C. Commissioning Water Systems (BG 2/2010). BSRIA; 2010.
- Ronceray M, Parsloe C. Pre-Commission Cleaning of Pipework Systems Amended 6th edition (BG 29/2021). BSRIA; 2021.

- Teekaram, A. Variable-flow water systems – Design, installation and commissioning guidance (AG 16/2002), BSRIA; 2002.
- The Air Tightness Testing and Measurement Association (ATTMA) Technical Standards:
    - TSL1: Measuring Air Permeability in the Envelopes of Simple Buildings Fan Pressurisation Method, Issue 4 September 2021
    - TSL2: Measuring Air Permeability in the Envelopes of Non-Simple Buildings Fan Pressurisation Method, Issue 2 September 2021
    - TSL3: Measuring Air Permeability in the Envelopes of Complex Buildings Fan Pressurisation Method, Issue 1 September 2021
    - TSL4: Measuring Air Permeability in Passivhaus and Low Energy Buildings Fan Pressurisation Method, Issue 2.0.1 June 2023
- CIBSE TM23: 2022 Testing buildings for air leakage.
- ACG Commissioning Guideline. AABC Commissioning Group; 2005.
- Additional guidance documents can be found at ASHRAE (www.ashrae.org/technical-resources/bookstore/commissioning).

Man 05 Aftercare

(all buildings)

Aim

To provide post-handover aftercare to the building owner or occupants during the first year of occupation to ensure the building operates and adapts, where relevant, in accordance with the design intent and operational demands.

Overview

Assessment type	Credits available	Minimum standards	Applicable assessment criteria
Part 1: Fabric and structure	0	None	Not applicable
Part 2: Core services	3 + 1 exemplary	Excellent	All (see ref 1.0)
Part 3: Local services	3 + 1 exemplary	Excellent	All (see ref 1.0)
Part 4: Interior design	2 + 1 exemplary	None	1 and 4–8

Assessment type specific notes

Ref	Assessment type specific note
1.0	**Speculative developments** For speculative projects (i.e. where the end occupiers are unknown), this issue – Man 05 Aftercare – will be filtered-out. Any relevant minimum standard will not be applicable in such cases.

Building type specific notes

Ref	Building type specific note
-	None

Issue specific notes

Ref	Issue specific note
3.0	**Zero carbon transition planning** Where the project is designed to be net zero carbon upon operation and uses no fossil fuels on-site (see M2.1), this credit will be filtered out.

Assessment criteria

One credit – Aftercare support

1 Provide aftercare support to the building occupiers through having in place operational infrastructure and resources. This includes as a minimum:

1.a A meeting between the aftercare support team or individual, and the building occupier or management team (prior to initial occupation, or as soon as possible thereafter) to:

1.a.i Introduce the aftercare support available, including the content of the building user guide (where it exists) and training schedule.

1.a.ii Present key information about features of the building including the design intent and how to use the building to ensure it operates as efficiently and effectively as possible.

1.b On-site facilities management training including:

1.b.i A walkabout of the building.

AND

1.b.ii Introduction to and familiarisation with the building systems, their controls and how to operate them in accordance with the design intent and operational demands.

1.c Provide initial aftercare support for at least the first month of occupation of the assessed refurbished areas, e.g. weekly attendance on-site, to support building users and management (the level of frequency will depend on the complexity of the building and building operations).

1.d Provide longer term aftercare support for occupiers for at least the first 12 months from occupation, e.g. a helpline, nominated individual or other appropriate system to support building users and management.

2 Establish operational infrastructure and resources to coordinate the collection and monitoring of energy and water consumption data for a minimum of 12 months, once the assessed refurbished areas are substantially occupied. This facilitates analysis of discrepancies between actual and predicted performance, with a view to adjusting systems and user behaviours accordingly (see M1).

One credit – In-use commissioning

3 Complete the following commissioning activities over a minimum 12-month period, once the refurbished building area becomes substantially occupied:

3.a Complex systems: The specialist commissioning manager will:

3.a.i Identify changes made by the owner or operator that might have caused impaired or improved performance.

3.a.ii Test all building services under full and part-load load conditions (see CN1).

3.a.iii Where applicable, carry out testing during periods of extreme (high or low) occupancy.

3.a.iv Interview building occupants (where they are affected by the complex services) to identify problems or concerns regarding the effectiveness of the systems.

3.a.v Compare sub-metered energy performance to the predicted energy performance.

3.a.vi Identify inefficiencies and areas in need of improvement.

3.a.vii Re-commission systems (following any work needed to serve revised loads) and incorporate any revisions in operating procedures into the operations and maintenance (O&M) manuals.

3.b Simple systems: The external consultant, aftercare team, or facilities manager will:

3.b.i Review thermal comfort, ventilation, and lighting, at three, six and nine month intervals after initial occupation, either by measurement or occupant feedback.

3.b.ii Identify deficiencies and areas in need of improvement.

3.b.iii Re-commission systems and incorporate any relevant revisions in operating procedures into the O&M manuals.

One credit – Post-occupancy evaluation

4 The client or building occupier commits to carry out a post-occupancy evaluation (POE) exercise one year after the refurbished building area is substantially occupied. This gains comprehensive in-use performance feedback (see criterion 5.b.v) and identifies gaps between design intent and in-use performance. The aim is to highlight any improvements or interventions that need to be made and to inform operational processes.

5 An independent party carries out the POE covering:

5.a A review of the design intent and construction process (review of design, procurement, construction and handover processes).

5.b Feedback from a wide range of building users including facilities management on the design and environmental conditions of the building covering:

5.b.i Internal environmental conditions (light, noise, temperature, air quality).

5.b.ii Control, operation and maintenance.

5.b.iii Facilities and amenities.

5.b.iv Access and layout.

5.b.v Energy and water consumption (see criterion 2 and M1).

5.b.vi Other relevant issues, where appropriate.

6 The independent party provides a report with lessons learned to the client and building occupiers.

7 The client or building occupier commits funds to pay for the POE in advance. This requires an independent party to be appointed to carry out the POE as described in criterion 5.

One exemplary credit – Zero carbon transition planning

8 Where net zero carbon benchmarks are not met for operational performance and fossil fuels are being used on-site, a competent person develops a Zero Carbon Transition Plan demonstrating how the asset will achieve net zero carbon in operation by 2050 at the latest (see M2).

Methodology

M1: Data collection and provision

M1.1: Collection and monitoring of energy and water consumption data

This function can be coordinated or carried out by a dedicated aftercare team or, where the building occupier is known and able to confirm compliance based on their existing or proposed operations for the building, the building owner or occupier's estates or facilities management team.

Data should generally be reported for assessed refurbishment areas only. Where metering covers the building as a whole and it is impractical to report based on specific areas, this should be clearly identified within the records to confirm the extent of the building covered by the data. Alternatively, area-weighting may be applied where energy or water usage is consistent throughout the building.

M1.2: Provision of annual energy and water consumption

One way of demonstrating compliance with this criterion is for the client or end user (see criterion 4) to register and therefore commit the building for assessment under *Part 2: Management Performance* of BREEAM In-Use.

M2: Zero carbon transition plan

Zero carbon transition plans are a relatively new market development. BREEAM assessments should follow a recognised best practice, or the plan should cover the contents listed below.

Overall ambition

Describe the strategic ambition of the asset's transition plan by disclosing its objectives, priorities, interim targets and milestones.

Implementation strategy

A description of the future energy and carbon reduction measures that would be implemented to eliminate on-site combustion and reduce energy use intensity to align with a 1.5°C pathway.

This should include:

— A timeline of measures to be implemented and the expected energy and carbon savings from each measure.

— The timeline of measure should be split into short-, medium- and long-term measures and define these terms.

— Any barriers to implementation, such as required grid upgrades etc.

Financial planning

Each measure should include estimated costs and savings.

Metrics and targets

To help assess progress against the Zero Carbon Transition plan, metrics and targets should be set and then progress reviewed on an annual basis. These should align with the Overall Ambition and the Implementation strategy. Targets should:

— Be clearly defined, including any relevant units, metrics and methodologies.

— Have a clear timeframe, defining a baseline and time period over which the target applies.

To ensure the Zero Carbon Transition Plan is implemented and evolves to reflect the latest technologies and costs:

1. Building owners and operators are encouraged to integrate the Transition Plan within the building's capital planning process to ensure alignment of budgets and timing.
2. Project teams are encouraged to pursue an in-use building performance certification scheme, such as BREEAM In-Use certification, once the asset is in operation, in order to verify the outcomes of implementing the Transition Plan and ensure that the plan is updated every three years.

For further links and guidance, see Additional information on page 90.

M2.1: No fossil fuels onsite

The scope of fossil fuel use on site includes all fossil fuel use by the building except for:

— Industrial scale process loads.

— Testing purposes within laboratory settings.

— Emergency and life safety systems such as firefighting, evacuation and back-up power in health care settings.

— Essential back-up systems serving buildings with functions where it is essential to maintain their continuous use, particularly in response to a disaster, for example hospitals, fire stations, police stations and emergency vehicle garages.

— Essential back-up systems serving data centres.

Compliance notes

Ref	Terms	Description
In-use commissioning		
CN1	In-use (seasonal) commissioning. See criterion 3.a.ii.	Full and part-load conditions can vary by season and seasons will vary depending on locations. In temperate climates full-load conditions might be heating equipment in mid-winter and cooling equipment in mid-summer; part-load conditions would occur in spring and autumn. In tropical areas, consideration might be given to wet and dry seasons, for example.
CN2	In-use (seasonal) commissioning of solar photovoltaics (PV)	Solar PVs can be excluded from the requirements for seasonal commissioning. This is because commissioning at a particular time of the year will not affect the original commissioning of the system.

Evidence

Criteria	Interim design stage	Final post-construction stage
Aftercare support		
1–2	Evidence of a commitment or contract to provide compliant aftercare support and training.	Evidence to verify what aftercare has or is due to take place and what procedures are in place for initial and long-term aftercare support. Where 13 months have passed since building occupation, aftercare data collection records should be available for submission.
In-use commissioning		
3	Relevant section or clauses of the building	In-use commissioning records/reports and

Criteria	Interim design stage	Final post-construction stage
	specification or contract. OR A letter of commitment from the client or developer. OR Appointment letters or commissioning responsibilities schedule where available.	records of occupant interviews. Where applicable, evidence that the specialist commissioning manager meets the definition for this role. Where a 15-month period has not passed since occupation of the building and full evidence is not yet available, the following should be provided: — Evidence of the appointment of a commissioning manager. — Schedule of commissioning responsibilities. — Confirmation of proposed commissioning dates. — Where some commissioning has taken place, but not all, these reports must be submitted.
Post-occupancy evaluation		
4–7	A signed and dated commitment by the client or developer or future building occupier.	Evidence of the appointment of the independent third-party and schedule of responsibilities which fulfils the BREEAM criteria. Where 15 months have passed since building occupation, a copy of the POE report must be provided.
Zero carbon transition planning		
8	Relevant section or clauses of the building specification or contract. OR A letter of commitment from the client or developer.	Copy of compliant zero carbon transition plan.

Definitions

Complex systems

These include, but are not limited to, air-conditioning, comfort cooling, mechanical ventilation, displacement ventilation, complex passive ventilation, building management systems (BMS), renewable energy sources, cold storage enclosures and refrigeration plant.

Competent person – Zero carbon transition plan

This would be a person or organisation that has sufficient knowledge and expertise of scenario analysis, financial planning, carbon risk and opportunity analysis and carbon accounting, specifically in real estate.

For further links and guidance, see Additional Information.

Independent party

To comply with criterion 5 relating to the use of an independent party, the client or design team needs to demonstrate either of the following options:

1. They have used a party independent of the design process to conduct the necessary POE exercise using a compliant method OR

2. If the POE is to be carried out by an organisation involved with the design of the refurbishment, e.g. the project architect, they must present the assessor with the evidence that demonstrates the independence of the POE process from the design process. BREEAM has not attempted to define what form this exercise must take; the onus is on the design team or relevant individual to clearly demonstrate to the BREEAM Assessor a credible level of independence.

In-use commissioning

This includes a programme of post-occupancy fine-tuning and seasonal testing. The seasonal testing evaluates how the building and its building services are performing under full load conditions during peak heating and cooling seasons, as well as part-load conditions in spring and autumn. This is to ensure that the building systems and control strategy are working correctly, efficiently and as designed or intended, including interfaces between systems. It is an opportunity to ensure that occupants are using systems correctly, systems are set up correctly and to make adjustments where required.

Other relevant issues

Other relevant issues include the following:

— Health, safety and wellbeing.
— Building user information including training for building users and operators.
— Value for money, achievement of business objectives.
— Sector–specific issues, such as impacts on absenteeism in offices, infection rates in healthcare facilities, pupil performance in schools etc.
— Sustainability performance (performance of any sustainable features or technologies, e.g. materials, renewable energy, rainwater harvesting etc.).

Post-occupancy evaluation (POE)

A post-occupancy evaluation (POE) is also known as Building Performance Evaluation (BPE).

The POE is used to improve the building operation, occupants' comfort and other areas based on its outcomes. Therefore, the POE provides suggestions on potential improvements, including, but not limited to the following:

— Re-commissioning activities
— Measures that maintain or improve end users' comfort and productivity
— Health and safety

A POE can also be used as part of the stakeholder consultation at the briefing stage for a new building or the refurbishment of an existing one, in cases where the building occupants are the same. This can be achieved through the use of a questionnaire or workshops to highlight lessons from the old or existing building that could be taken into account in the design of the new project.

POE methodologies

Any POE or BPE methodology that fulfils the criteria can be used. Further guidance on POE can be found in the following resources:

— Post Occupancy Evaluations | WBDG - Whole Building Design Guide.
— BCO Guide to Post Occupancy Evaluation (POE), British Council for Offices, 2023.
— BRE Digest 478, Building performance feedback: getting started, Building Research Establishment, 2003.
— Guide to Post Occupancy Evaluation Report and Toolkit, HEFCE, AUDE & University of Westminster, 2006.
— The Building Use Studies (BUS) methodology (busmethodology.org.uk) is an occupant satisfaction survey that will fulfil part of the POE credit requirement, occupant feedback stage.
— BSRIA Guide to Building Performance Evaluation is a general introduction to BPE. BSRIA; 2015. 27 CIBSE. GVF2012 Guide F: Energy.

Specialist commissioning manager

An individual will meet the requirements of a specialist commissioning manager where:

1. They hold a recognised qualification for commissioning management and/or degree in mechanical, electrical or building services engineering or related field.

2. Have acquired substantial expertise through a minimum of three years relevant experience (within the last five years) in the building services industry, with a focus of mechanical and electrical commissioning.

Those accredited to a level of Senior Commissioning Manager under The Commissioning Specialists' Association (CSA) OR Holding ASHRAE Building Commissioning Professional certification (BCxP) will be deemed to be specialist commissioning managers.

In principle, it is possible for the specialist commissioning manager to be from the same organisation as the main contractor provided any conflicts of interest have been declared and records show how they have been managed to provide confidence that commissioning will be carried out appropriately.

The separate roles of the main contractor and specialist commissioning manager are so that the installation and commissioning are carried out independently by different parties.

Substantially occupied

For the purposes of this BREEAM issue, a building or assessed refurbished area is considered as substantially occupied when approximately 80% of each building function area, applicable to the assessment, is occupied.

Additional information

Absence of predicted performance data

Where building occupiers do not have predicted performance models, it may be more appropriate to benchmark actual building performance data with other sources of Building Performance Evaluation Data and benchmarks. The following CIBSE sources of building benchmarking information are internationally recognised:

- CIBSE Guide F: Energy Efficiency in Buildings
- CIBSE TM46: Energy Benchmarks
- CIBSE TM47: Operational Ratings and Display Energy Certificates

Additional information of building performance and benchmarking can be found at Buildings Performance Institute Europe (BPIE) (www.bpie.eu) and ASHRAE (www.ashrae.org).

Actual vs predicted performance

In most cases it is not feasible to accurately compare predicted vs actual performance due to variances in the assumptions used in the models. Figures reported via the UK's Carbon Buzz website show that on average, buildings consume between 1.5 and 2.5 times the predicted values. When comparing predicted with actual values, an analysis should be carried out to understand why there may be discrepancies in performance. These discrepancies can be for several reasons including:

- Predicted energy consumption is normally based upon building regulation compliance models which only focus on 'regulated' energy use. Additional unrelated energy use may not have been modelled in the design prediction model.
- They may be extended use due to extra occupancy and operating hours, not accounted for in the predicted models.
- Inefficiencies from poor control, bad commissioning or poor maintenance.
- Additional special functions such as a cafeteria, server rooms etc. not accounted for in the predicted model.
- Variances in actual occupant behaviour that vary from predicted, such as use of small power and lighting.

CIBSE TM54 Evaluating Operational Energy Performance of Buildings at the Design Stage (2022) provides guidance on how to improve the accuracy of the model for operational energy use of buildings at the design stage.

Zero carbon transition plan

For additional guidance on preparing a zero carbon transition plan and organisations who may provide support, please refer to:

- CDP (www.cdp.net), including CDP Technical Note: Reporting on Climate Transition Plans which provides requirements for a credible climate transition plan.
- International Transition Plan Network (ITPN) (itpn.global/tpt-legacy/)
- The Transition Plan Taskforce (TPT) (transitiontaskforce.net)

- Corporate Sustainability Reporting Directive (CSRD) (www.carbontrust.com/news-and-insights/insights/corporate-sustainability-reporting-directive-csrd-explained)
- Science Based Targets Initiative (sciencebasedtargets.org)

Health and wellbeing



Summary

This category encourages the increased comfort, health and safety of building occupants, visitors and others within the vicinity. Issues in this section aim to enhance the quality of life in buildings by recognising those that encourage a healthy and safe internal and external environment for occupants.

Assessment issues

Hea 01 Natural light	up to 6 credits + 2 exemplary
Hea 02 Electric light	2 credits + 1 exemplary
Hea 03 Non-visual effects of light	1 credit
Hea 04 Indoor air quality	up to 5 credits + 3 exemplary
Hea 05 Thermal comfort	up to 3 credits
Hea 06a Acoustic performance	up to 4 credits
Hea 06b Acoustic performance	up to 4 credits
Hea 07 Safe and accessible design	3 credits + 1 exemplary

Hea 01 Natural light

(all buildings)

Aim

To ensure daylighting is considered at the design stage and ensure best practice in visual performance, visual comfort, and overall wellbeing for building occupants.

Overview

Assessment type	Credits available	Minimum standards	Applicable assessment criteria
Part 1: Fabric and structure	up to 5 + 1 exemplary (building type dependent)	None	4–9, 12 (see ref 1.0, 1.1 and 1.3)
Part 2: Core services	0	None	Not applicable
Part 3: Local services	0	None	Not applicable
Part 4: Interior design	up to 6 + 2 exemplary (building type dependent)	None	All (see ref 1.0, 1.2 and 1.3)

Assessment type specific notes

Ref	Assessment type specific note
1.0	**View out** Where it is not possible to confirm which areas of the building will contain workstations or benches or desks, then all areas of the building designed for or likely to be occupied by workstations or benches or desks must comply with the relevant criteria.
1.1	**Daylighting** Where the assessment is speculative and therefore the final layout is not defined (e.g. only an open plan shell is provided in each tenanted space), the required percentage of each open plan shell should meet the daylighting requirements. However, where it is possible to designate separable ancillary areas that would be required in the space (such as toilets or server rooms), these can be excluded from the calculation.
1.2	**Part 4 application** It is recognised that fit-out projects will have limited influence over fabric measures that can increase natural light. The criteria are applicable to assess the impact of changes to internal layout on daylighting and view out (e.g. location of partitions, use of glare control film on glazing etc.) to recognise fit-out projects that optimise the percentage of spaces that benefit from daylighting and view(s) out.
1.3	**Glare control and View out – No relevant area** If the scope of the assessment does not include any relevant building areas (see Definitions) for glare control and/or view out, the respective criteria are not applicable and the credit is filtered out.

Building type specific notes

Ref	Building type specific note
2.0	**Residential institution (long-term stay) – Living rooms** **Residential care home – Communal lounges, individual bedrooms** All relevant areas are to be within 5 m of a wall which has a window or permanent opening providing an adequate view out. The window or opening must be ≥ 20% of the surrounding wall area.
2.1	**Residential institutions and Hospitality – Bedrooms**

Ref	Building type specific note
	Glare is not considered to be problematic in bedrooms in Residential institutions (long-term stay and short-term stay) and Hospitality assessments where the occupants are assumed to be elsewhere during the daylight hours. The only exception to this is where designated additional office working space is provided within a bedroom. In these circumstances it is the role of the assessor to determine if individual spaces should be determined as 'relevant building areas' in accordance with guidance provided.
2.2	**Commercial kitchens** It is not necessary to provide a view out for commercial kitchens. This is because in such a space it is likely that kitchen staff will move around, doing various tasks. This makes the requirements for the view out to rest the eyes unnecessary.
2.3	**Retail** Where there is no 'Other occupied space' within the asset, the additional daylight credit in Table 14 can be awarded when the 'Sales area' meets the daylight requirements.
2.4	**Prison buildings – Cells** An adequate view out from a normal standing or sitting position. The distance between each window and nearest external solid object (i.e. buildings, screens, walls or fences) is ≥ 10m. Where existing features prevent compliance with this criteria in less than 20% of the cells within the building, the credit can still be awarded.

Assessment criteria

One credit – Glare control

1 Identify areas at risk of glare using a glare control assessment. The glare control assessment also justifies any areas deemed not at risk of glare.

2 Where risk has been identified within a relevant building area, a glare control strategy is used to design out the potential for glare (see M1).

3 The glare control strategy does not increase energy consumption used for lighting. This is achieved by:

3.a Maximising daylight levels in all weather (cloudy or sunny).

AND

3.b Ensuring the use or location of shading does not conflict with the operation of lighting control systems.

Up to three credits – Daylighting

4 One credit when 80% of the relevant area meets the minimum performance requirements for glazed area as a percentage of floor area in Table 16 on page 100 (see M2.1).

5 Up to two credits when daylighting criteria have been met using one of the options outlined in Table 14 on page 96 (see M2.2):

5.a The relevant building areas meet good practice average and minimum point daylight illuminance criteria as outlined in Table 14 on page 96.

OR

5.b The relevant building areas meet any level of recommendation using the daylight illuminance criteria in EN 17037:2018+A1:2021.(3)

OR

5.c The relevant building areas achieve at least 'nominally accepted' daylight sufficiency as per IES LM-83-23.(4)

One credit – Direct sunlight to windows

(Healthcare, Residential institutions – Long-term stay, Prisons)

6 Achieve at least one credit for 'Daylighting'.

7 All relevant units have at least one relevant area that receives at least 3 hours of direct sunlight at windows on equinox day (21 March or 21 September, as the average representation of annual conditions) assuming a cloudless sky (see M3).

One credit – View out

8 At least 95% of the floor area in 95% of spaces for each relevant building area are within the distances of a window or permanent opening that provides an adequate view out (see Definitions and M4), as outlined in Table 13 below.

Table 13: Window or opening size required as a percentage of surrounding wall area depending on the distance of the desk or workspace to the window or opening

Distance from window to workspace or desk, X (in metres)	Window or opening size (as % of surrounding wall area)
X < 8	20%
8 ≤ X ≤ 11	25%
11 < X ≤ 14	30%
X > 14	35%

OR

9 At least 75% of the floor area in 95% of spaces for each relevant building area can meet both of the following criteria:

9.a Horizontal sight angle ≥ 28°.

AND

9.b The landscape layer and at least one additional layer (sky or ground) are visible through a permanent opening (see M4.4).

One exemplary credit – Evaluating glare from daylight

10 Achieve the credit for 'Glare control' (criteria 1–3).

11 An evaluation has been undertaken to demonstrate compliance with either of the following and M5:

11.a The Daylight Glare Probability (DGP) does not exceed 0.40 over more than 5% of annual operating hours at all workstations in all relevant building areas.

OR

11.b Annual Sunlight Exposure ASE1000, 250 ≤ 10% of an occupied space. This means no more than 10% of the occupied space in all relevant building areas can receive a daylight illuminance of ≥ 1000 lux for ≥ 250 hours per year.

One exemplary credit – Daylighting

12 Daylighting criteria have been met using one of the following options:

12.a Relevant building areas meet exemplary criteria for average and minimum point daylight illuminance as outlined in Table 15 on page 98.

OR

12.b Relevant building areas meet the medium rating in EN 17037:2018+A1:2021 and the relevant criteria in Table 15 on page 98.

OR

12.c Relevant building areas meet the preferred rating in IES LM-83-23 and the relevant criteria in Table 15 on page 98.

Checklists and tables

Table 14: Space type and illuminance requirements – in Option 1 both criteria (average daylight illuminance and minimum daylight illuminance) must be met

Area type	Minimum area to comply		Option 1: Good practice criteria		Option 2: EN 17037	Option 3: IES LM-83
	1 credit	2 credits	Average daylight illuminance (averaged over entire space)	Minimum daylight illuminance at worst lit point		
Education buildings (up to 2 credits available)						
Preschools, schools, crèche – occupied spaces	-	80%	At least 300 lux for 2000 hours per year or more	At least 90 lux for 2000 hours per year or more	Any level of recommendation using the daylight illuminance criteria in EN 17037 (see M2.5)	At least 'nominally accepted' daylight sufficiency as per IES LM-83 (see M2.5)
Universities, colleges and higher education – occupied spaces	60%					
Residential institutions and Hospitality (1 credit available*)						
Kitchens	100%	-	At least 100 lux for 3450 hours per year or more	At least 30 lux for 3450 hours per year or more	Any level of recommendation using the daylight illuminance criteria in EN 17037 (see M2.5)	At least 'nominally accepted' daylight sufficiency as per IES LM-83 (see M2.5)
Living rooms, dining rooms, studies (including home offices)		-				
Non-residential or communal occupied spaces	80%	-	At least 200 lux for 2650 hours per year or more	At least 60 lux for 2650 hours per year or more		
Retail buildings (2 credits available**)						
Sales areas	35%	-	At least 200 lux point daylight illuminances for 2650 hours per year or more		Any level of recommendation using the daylight illuminance criteria in EN 17037 (see M2.5)	At least 'nominally accepted' daylight sufficiency as per IES LM-83 (see M2.5)
Other occupied areas	80%	-	At least 200 lux for 2650 hours per year or more	At least 60 lux for 2650 hours per year or more		
Office buildings (2 credits)						
All occupied spaces, unless indicated in Definitions on page 106	-	80%	At least 300 lux for 2000 hours per year or more	At least 90 lux for 2000 hours per year or more	Any level of recommendation using the daylight illuminance criteria in EN 17037 (see M2.5)	At least 'nominally accepted' daylight sufficiency as per IES LM-83 (see M2.5)
Healthcare buildings (2 credits available*)						
Staff and public areas	80%	-	At least 300 lux for 2000 hours per year or more	At least 90 lux for 2000 hours per year or more	Any level of recommendation using the daylight illuminance criteria	At least 'nominally accepted'

Area type	Minimum area to comply		Option 1: Good practice criteria		Option 2: EN 17037	Option 3: IES LM-83
	1 credit	2 credits	Average daylight illuminance (averaged over entire space)	Minimum daylight illuminance at worst lit point		
Occupied patients' areas (dayrooms, wards) and consulting rooms		-			in EN 17037 (see M2.5)	daylight sufficiency as per IES LM-83 (see M2.5)
Staff and public areas	-	80%	At least 300 lux for 2650 hours per year or more	At least 90 lux for 2650 hours per year or more		
Occupied patients' areas (dayrooms, wards) and consulting rooms	-					
Prison buildings (2 credits available*)						
Cells and custody cells	-	80%	At least 100 lux for 3150 hours per year or more	N/A	Any level of recommendation using the daylight illuminance criteria in EN 17037 (see M2.5)	At least 'nominally accepted' daylight sufficiency as per IES LM-83 (see M2.5)
Internal association or atrium			At least 300 lux for 2650 hours per year or more	At least 210 lux for 2650 hours per year or more		
Patient care spaces						
Teaching, lecture and seminar spaces			At least 300 lux for 2000 hours per year or more	At least 90 lux for 2000 hours per year or more		
Industrial and all Other building types (1 credit available*)						
Internal association or atrium area	80%	-	At least 300 lux for 2650 hours per year or more	At least 210 lux for 2650 hours per year or more	Any level of recommendation using the daylight illuminance criteria in EN 17037 (see M2.5)	At least 'nominally accepted' daylight sufficiency as per IES LM-83 (see M2.5)
Teaching, lecture and seminar spaces		-	At least 300 lux for 2000 hours per year or more	At least 90 lux for 2000 hours per year or more		
All occupied spaces, unless indicated in Definitions on page 106		-				

Notes:
* All spaces must comply to achieve 1 credit.
** Each space can be awarded credits independently.

Table 15: Exemplary level illuminance value requirements (both criteria – average daylight illuminance and minimum daylight illuminance at worst lit point – must be met for daylight illuminance method)

Area type	Exemplary credits	Minimum relevant area to comply	Average daylight illuminance (averaged over entire space)	Minimum daylight illuminance at worst lit point	EN 17037 OR IES LM-83-23
All building types (excluding retail – see below)					
Multi-storey buildings Occupied spaces (unless indicated below)	1	80%	At least 300 lux for 2650 hours per year or more	At least 90 lux for 2650 hours per year or more	EN17037-Medium IES-Preferred
Single storey buildings Occupied spaces (unless indicated below)		80%	At least 300 lux for 3000 hours per year or more	At least 120 lux for 3000 hours per year or more; or in spaces with glazed roofs (such as atria), at least 210 lux for 3000 hours per year or more	EN17037-Medium IES-Preferred
Prisons and courts buildings Cells and custody cells		80%	At least 100 lux for 3450 hours per year or more	N/A	EN17037-Medium IES-Preferred
Prison buildings Internal association or atrium areas		80%	At least 300 lux for 3250 hours per year or more	At least 210 lux for 3250 hours per year or more	EN17037-Medium IES-Preferred
Retail					
Retail buildings Sales areas	1	50%	At least 300 lux point daylight illuminances for 2000 hours per year or more		EN17037-Medium IES-Preferred
Retail buildings Other occupied areas		80%	Select relevant criteria above for occupied spaces dependent on whether you are assessing a multi-storey or single storey building.		EN17037-Medium IES-Preferred

Methodology

M1: Glare control

M1.1: Glare control assessment

A glare control assessment is used to determine the areas of the building that are at risk of glare, including a demonstration of the building areas not at risk. This can be achieved through a survey of or modelling of the relationship between sunlight and the building. The design must consider the possibility of glare from all sources, including direct sunlight, reflected sunlight and contrast glare. Design studies can be used to demonstrate that glare cannot reach the eyes of building occupants, or the computer screens they are using, during occupied hours.

Where compliant shading measures are specified for all relevant building areas regardless of the risk of glare, a glare control assessment will not be necessary. The glare control strategy must demonstrate building design measures are specified for all relevant building areas, while also complying with criteria 3 to 3.b.

It is acceptable to account for surrounding buildings, structures or other permanent environmental features when using simulation modelling to assess the risk of glare, provided this accounts for both direct sunlight and reflected glare from glazing or reflective surfaces.

Where roof lights are present, they must be considered when demonstrating that the glare control strategy provides adequate control/measures for minimising glare in that space.

M1.2: Assessing compliant forms of glare control

Compliant shading measures for meeting glare control criteria are:

1. Internal, mid-pane, or external shading such as opaque Venetian or close weave fabric blinds where:
    a. The openness factor of blinds is ≤ 1% and the fabric light transmittance value is ≤ 0.1 (10%).

    OR

    b. The openness factor of blinds is ≤ 3% and the fabric light transmittance value is ≤ 0.03 (3%).

    OR

    c. The shading is classified as class 3 or 4 in accordance with Table 7 of EN 14501:2021.
2. The shading can be occupant controlled or automatically controlled with manual override.

The following measures can be used in addition to the above, but are not compliant on their own:

— Building-integrated measures (e.g. overhangs, brise-soleil, fins, or light shelves).

— Variable transmittance glazing (e.g. electrochromic, photochromic, or thermochromic glass).

— Window films and tinted glazing.

Transmittance values should be based on those quoted for 'visible light' or 'optical transmittance'.

Glare control must provide shading from both high-level summer and low-level winter sun where relevant to the location of assessment. Design studies can be used to demonstrate the sunlight is prevented from reaching the eyes of building occupants, or the computer screens they are using, during occupied hours.

M1.2.1: Alternative shading measures

Variable transmittance glazing (e.g. electrochromic, photochromic, or thermochromic glass) as well as window films can reduce glare from the bright sky but may have little impact on glare from the sun. Therefore, such shading options should be used in conjunction with other glare control measures in all cases where control of glare from the sun is required.

Solar control or 'tinted' glazing could potentially support the attainment of this requirement. It should be noted that whilst certain types of glazing, such as low emissivity glazing, may be slightly tinted, they may not necessarily be effective in reducing disabling glare. For facades receiving direct sunlight, tinted windows alone are unlikely to be sufficient in most situations. The assessor must provide evidence to demonstrate that the particular glazing type, when used on the assessed building for a given location, meets the overarching aim of preventing disabling glare.

Curtains (where used without other forms of shading) do not meet the criteria for the glare control credit. This is because they do not provide sufficient control to optimise daylight into the space. As such, the use of curtains to control glare is likely to cause occupants to rely more on artificial lighting.

M1.3: Applicability of glare control – Atrium spaces

The 'Glare control' criteria are applicable to all spaces that meet the definition for 'relevant building areas – glare control'. This includes reception and atrium spaces where these spaces meet this definition. Where an atrium space does not meet the definition of 'relevant building areas – glare control' it does not need to comply with the criteria. However, the risk of glare must be considered for any relevant building areas that connect off the atrium space. This is because sunlight could pass through the atrium causing discomfort for users of other relevant building areas that connect to the atrium space. Where this is the case, building design measures or the provision of shading will be required to enable glare to be controlled or eliminated.

M2: Daylight

M2.1: Calculating glazed area as a percentage of floor area in occupied spaces and assessment against the minimum performance requirements

The following steps must be followed in order to assess whether the asset demonstrates compliance with the minimum performance requirements. Where daylight needs to be excluded from or lighting conditions need to be strictly controlled in an occupied space, e.g. media or arts production areas, special education needs sensory space or x-ray rooms, these spaces can be excluded from assessment.

1. Determine the latitude for the asset's location.
2. Calculate the net internal area (m²) for each relevant occupied space and the total net internal area (m²) for all relevant occupied spaces.
3. For each relevant occupied space, calculate the total glazed area (m²) of all windows and roof lights within the space. The frames are not included in the calculation, only the area of glass.
4. For each relevant occupied space, calculate the percentage of glazed area to floor area as follows:

$$Percentage\ glazed\ area\ to\ floor\ area = \left(\frac{Total\ glazed\ area\ in\ occupied\ space}{Net\ internal\ area\ of\ occupied\ space}\right) \times 100$$

5. For occupied spaces with tinted or diffusing glazing, it is necessary to apply a glass transmittance weighting to the glazed area to floor area percentage. For clear or low emissivity single, double or triple glazing, no weighting correction is required. For tinted or diffusing glazing, the glazing to floor area percentage is multiplied by T/0.8, where T is the light transmittance of the glazing (expressed as a decimal). If the glass transmittance is not known, the glazing to floor area percentage is multiplied by 0.25 for tinted glazing and by 0.60 for diffusing glazing.
6. For each relevant occupied space, check that no part of the occupied space is more than X metres on plan from the glazed area, where X is three times the height of the top of the glazed area above the floor level. For example, if the height to the top of a glazed area from the floor is 3m, then no part of the occupied space must be further than 9m from the glazed area. Where an occupied space does not meet this distance requirement, it is not possible for the space to comply with the minimum performance requirements.
7. For each relevant occupied space, check if there are any external obstructions (e.g. adjacent buildings or structures, trees or hedges, etc.) that will potentially limit the amount of daylight reaching the space. If there is an obstruction, its horizontal distance away from the glazing must be greater than its height above the centre of the glazing. For example, if an obstruction's height is 10m above the centre of the glazing, then the obstruction must be at least 10m away from the glazing. Where an obstruction does not meet this distance requirement, the obstructed glazing does not count towards the total glazed area in the calculation.
8. For each relevant occupied space, compare the transmittance weighted glazed area to floor area percentage to the minimum performance requirements in Table 16 below for the asset's latitude to assess whether the occupied space is compliant or not.

   Table 16: Minimum performance requirements for glazed area as a percentage of floor area in occupied space

Latitude	< ± 40°	≥ ± 40° < ± 45°	≥ ± 45° < ± 50°	≥ ± 50° < ± 60°	≥ ± 60°
Glazed area to floor area	≥ 7%	≥ 8%	≥ 9%	≥ 10%	≥ 11%

9. Calculate the percentage of all relevant occupied space within the asset that meets the minimum performance requirements in accordance with steps 4 - 8 above, and therefore determine the number of credits that can be awarded, as follows:

$$Percentage\ of\ relevant\ occupied\ space = \left(\frac{Total\ net\ internal\ area\ of\ compliant\ occupied\ space}{Total\ net\ internal\ area\ of\ all\ relevant\ occupied\ space}\right) \times 100$$

M2.2: Calculating the percentage of the assessed area

The percentage of the total floor area of all relevant areas must comply where the criteria specify that a percentage of floor area must have adequate daylight illuminance. For example, six relevant rooms each have a floor area of 150 m² making a total relevant floor area of 900 m²; 80% of this floor area must meet the criterion, so 720 m² must comply. This is the equivalent to 4.8 rooms. As daylight illuminance is a measure of daylight across the whole room, only whole rooms can be compliant. The number of rooms must always be rounded up so, in this example, five rooms must comply to achieve the credit.

Spaces whose size is substantially larger should meet the daylight criteria on their own. In these cases, the percentage requirement is still applicable to the floor area of the remaining rooms.

For example, where 80% of 'teaching, lecture and seminar spaces' need to comply with the daylight illuminance criteria, if we have a large lecture theatre of 200 m² and 3 seminar spaces of 30 m² each, the requirement for 80% would mean 232 m² of the floor area need to comply. This would require the lecture theatre and two seminar spaces to comply.

Where an asset type has different area type requirements in Table 14 on page 96 or Table 15 on page 98, then each area type present within an assessment must meet the relevant requirements to achieve the one or two credits available.

M2.3: Calculation model

Daylighting calculations for criterion 5, will require assessment via detailed computer modelling to simulate the daylight illuminance at calculation points within the assessed spaces. The calculation model should include all the room surfaces, and any surface outside the room that could affect the direction or quality of light received.

If any of the assessed spaces is expected to contain moveable shading device (such as blinds), then a dynamic modelling of their use should be included in the calculation for options 2 and 3, consideration should be made to the shading guidance in EN 17037 or IES LM-83-23, respectively.

Calculations are to be carried out using climatic data for the location of the site via the use of an appropriate weather file within the software. The calculations are to include at least an hourly interval for a typical year and must use appropriate simulation parameters as described in Guidance Note 50.

M2.4: Alternative route for UK school buildings

For UK school buildings, it is acceptable to use the Department for Education Generic Design Brief (GDB), Technical Annex 2E requirements or the Education and Skills Funding Agency (ESFA) framework requirements as an alternative method of compliance with the 'Daylighting' criteria.

In this case, evidence would be required to demonstrate that the requirements in the framework have been adhered to. Respectively, the set daylight performance criteria by each area type (weighted by area) must be met in line with the GDB framework requirements. Or at least 80% of all relevant room types (weighted by area) must meet the relevant criteria in the ESFA framework requirements.

M2.5: Daylight levels

The daylight levels to achieve the standards credits for EN17037 and IES-LM-83-23 are outlined in Table 17 below below. In order to achieve the standard credits, these performance levels and any area type and minimum area requirements in Table 14 on page 96 must be met.

Guidance Note 50 provides full methodology and guidance of application of EN17037 and IES-LM-83-23 standards, including the exemplary levels.

Table 17: Standard credits – Minimum performance requirements for option 2 and 3 in Table 14 on page 96

EN 17037 Target illuminances for at least half of annual daylight hours	
Side lit spaces	Top lit spaces
Target illuminance E_T (lx) = 300 lux for at least 50% of reference plane AND Minimum target illuminance E_{TM} (lx) = 100 lux for at least 95% of reference plane	Target illuminance E_T (lx) = 300 lux for at least 95% of reference plane
IES-LM-83-23	
sDA300, 55%	

Daylight illuminance across at least 55% of the reference plane area (or grid points analysed) exceeds 300 lux for at least half of annual operating hours.

M3: Direct sunlight

M3.1: Relevant building areas

Relevant units must each be assessed separately with at least one relevant area from each unit meeting the criteria.

M3.2: Calculation

The criterion applies to rooms of all orientations, although if a room faces north of due east or west it is less likely to be met (as experienced in the northern hemisphere).

A geometrical calculation model should be used and include in detail any surrounding obstructions and surfaces outside the room that could affect the sunlight received. Surface reflectances are not needed for this calculation. The amount of sunlight received can be determined using either a manual procedure or adequate software. Further reference can also be made to EN 17037, Annex D.(5)

Where window positions are already known, a reference point on the inside face of the window aperture at the centre of the opening width and at least 1.2 m above the floor and 0.3 m above the sill (whichever is the higher) should be used. For a horizontal daylight opening (such as a rooflight), the reference point should be taken at the geometrical centre on the inside face of the opening.

Window reveals, balconies and overhangs that block sunlight must be included in the assessment, but the effect of window frames and bars can be discounted.

If a room has multiple windows, the amount of sunlight received by each can be added together provided they occur at different times and sunlight hours are not double counted.

M4: View out

M4.1: Relevant building areas

The view out criteria apply to all 'relevant building areas'. The assessment is based on distinct spaces that are considered relevant building areas. These are referred to as 'relevant spaces'.

- A relevant space is compliant where the required percentage of the floor area has an adequate view out.
- Credits are awarded based on the percentage of all relevant spaces that are compliant.

For example, 19 out of 20 relevant spaces have adequate view out for 95% of each separate space's floor area. This results in 95% of the relevant spaces meeting the view out requirements, from which the number of available credits can be determined.

Where rooms contain areas of different functions, only relevant areas should be assessed. In this case a notional line can be drawn on the plans and calculations made based on these relevant areas only. However, spaces such as circulation routes or other transient spaces within a relevant area can only be excluded if the route or area is clearly defined by the building layout. If this is arbitrary or based solely on a proposed furniture layout, it cannot be excluded. Features of the building layout which may be considered as dictating a function area would include, for example, the position of doors, columns or fixed furniture such as a reception desk or canteen servery.

M4.2: Calculating the window to wall ratio

This should be calculated based on the glazed area of window or opening, expressed as a percentage of the surrounding wall area.

The frames are not included in the calculation, only the area of glass. The external wall area also includes the area of the window or opening itself.

Where the ceiling height of the room is unusually high, relative to the window height, the wall area can be calculated based on a standard ceiling height for the building type.

Where there are windows or openings in different walls within a space, each desk or workspace only needs to have one compliant view out. In this situation, the window or opening nearest to each relevant area will most likely meet criterion 8.

M4.3: Horizontal sight angle

This defines the width of the view from a specific reference point in the assessed space.

To assess the horizontal sight angle over a room area, a horizontal grid should be built as illustrated in Figure 2 below. The grid spacing should be no more than 0.3 metres in residential applications and no more than 0.5 metres in non-residential applications. The horizontal sight angle as formed by the view opening reveals should be determined at each grid point, and then the percentage room area with a horizontal sight angle above a certain threshold can be calculated from the percentage of grid points exceeding that threshold.

Where a space has more than one opening, the horizontal sight angle at a reference point can be taken as the sum of the horizontal single angles determined for each opening as seen from the reference point unless the openings are on opposite walls. Further reference can also be made to EN 17037, Annex C.(6)

In Figure 2 below below, the medium and high grid points (highlighted in green) meet the horizontal sight angle threshold of above 28°. The reception circulation area has been excluded in line with M4.1, based on the location of a reception desk and area. As the compliant area is less than 75% of the relevant floor area, this example would not meet criteria 9.a.

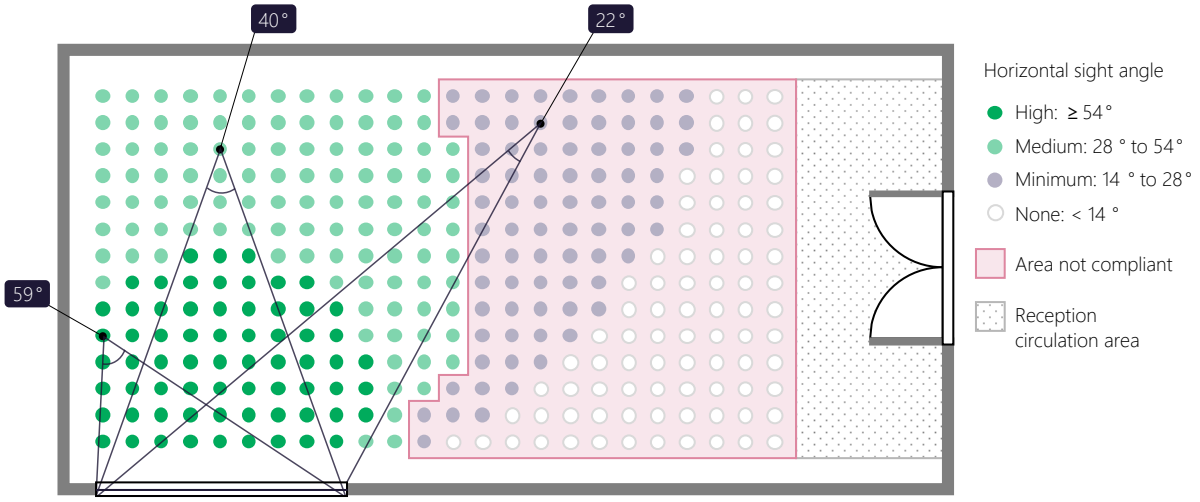


Figure 2: Example of horizontal sight angle assessment in a space with one opening (circles indicate grid points)

M4.4: View layer

A view is considered to comprise three distinct layers: the sky layer; the landscape layer; and the ground layer. The ground layer can include information of activities, whilst the landscape layer can consist of buildings, nature, a combination of these, or only the horizon. The more view layers are visible from a reference point, the higher the view quality for that point.

To assess the number of visible view layers over a room area, a horizontal grid should be built as illustrated in Figure 2 above. The grid spacing should be no more than 0.3 metres in residential applications and no more than 0.5 metres in non-residential applications. The number of visible view layers should be determined at each grid point, and then the percent room area with the number of visible view layers above a certain threshold can be calculated from the percentage of grid points exceeding that threshold.

Where a space has more than one opening, the number of visible view layers at a reference point can be taken as the number of visible view layers seen from the reference point through all openings that are not on opposite walls.

M5: Evaluating glare from daylight

M5.1: Daylight Glare Probability

Daylight Glare Probability (DGP) is a discomfort glare metric developed for side lit spaces. It factors in vertical daylight illuminances at the eye as well as brightness and position of potential sources of glare in the visual field of an observer.

Guidance Note 50 provides guidance on the methodology and application of the Daylight Glare Probability requirements. EN 17037 uses DGP to assess protection from glare for spaces where the activities are comparable to reading, writing, or using display devices and the occupants are not able to choose position and viewing direction.

Compliance with the BREEAM exemplary level criteria is achieved if for all workstations in all relevant building areas the calculated DGP value does not exceed 0.40 over more than 5% of annual operating hours.

The DGP assessment can be applied to a space with vertical or inclined daylight openings, but this method is not applicable for a space with daylight openings in a horizontal surface (such as rooflights). In the later case the Annual Sunlight Exposure (ASE) method should be used.

Additionally, DGP cannot be applied to cases where vertical illuminance is not expected to be a good indicator for the perception of glare; for example, vending areas of shops, sports halls and deep or dark spaces with very small daylight openings. Furthermore, DGP cannot be applied to positions in a space which are far away from daylight openings or receive low daylight levels.

M5.2: IES LM-83 – Annual Sunlight Exposure

Annual Sunlight Exposure (ASE) is a measure of sunlight to suggest if a space is over-sunlit with the potential for glare or heat gains. Whilst ASE is not a direct measure of glare, it can indicate the potential for glare if sunlight exposure exceeds a certain limit.

Guidance Note 50 provides guidance on the methodology and application of the Annual Sunlight Exposure requirements. Compliance with the BREEAM exemplary level criteria is achieved if in all relevant building areas, ≤ 10% of the regularly occupied space can:

1. Receive a daylight illuminance of ≥ 1000 lux.
2. For ≥ 250 hours per year.

In other words, at least 90% of the regularly occupied space in all relevant building areas can receive no more than 1000 lux from daylight over no more than 250 hours per year.

Compliance notes

Ref	Terms	Description
Glare control		
CN1	No windows in relevant areas	Where a relevant area does not include any windows, the glare control criteria can be considered as met for this area. Note that the view out and daylighting criteria would not be achieved in rooms with no windows.
Daylight		
CN2	National best practice standards	It is possible to use a national or local equivalent for the daylight criteria; however this must be approved by BRE Global. The Approved Standards list can be used to check for previously approved standards or to propose a new national or local standard.
CN2.1	Compliant daylight metrics	As outlined in the criteria, only daylight illuminance methods are accepted. If using EN 17037 or IES LM-83 options, only the daylight illuminance method from these standards is compliant with the criteria, other methods such as daylight factor are not.
CN2.2	Mixed-use buildings	In the case of a mixed-used buildings, the number of daylight credits are adjusted to account for the various asset types present. For full details, see Guidance Note 20 (GN20). Criteria for all relevant function areas must be achieved. The number of credits available is based on the asset type present which has the highest number of credits available. For example: — Asset type A: 1 credit available — Asset type B: 2 credits available Credits available to the assessment: 2 credits. In this example if both assets achieved maximum credits, 2 credits would be awarded.
View out		
CN3	First aid rooms	The view out criteria do not apply to dedicated first aid or medical rooms in non-healthcare projects.
CN3.1	Security and sensitive rooms	The view out criteria do not apply to rooms containing security, critical systems or sensitive material, such as CCTV monitoring rooms, where the presence of compliant

Ref	Terms	Description
		windows would compromise a critical function of the space.
CN3.2	Exclusion of non-relevant areas	Only relevant areas within rooms should be assessed. However, spaces such as circulation routes or other transient spaces within a relevant area can only be excluded if the route or area is clearly defined by the building layout, this is further explained within M4.1.

Evidence

Criteria	Interim design stage	Final post-construction stage
Glare control		
1–3	Design drawings and relevant section or clauses of the building specification or contract. Glare control assessment, where required.	Assessor site inspection report and photographic evidence. Final construction drawings or equivalent. Where relevant, manufacturer's data sheets or product literature. Glare control assessment, where required.
Daylighting		
4–5, 12	Design drawings and daylight calculations. OR Relevant section or clauses of the building specification or contract confirming national best practice daylighting guidelines or BREEAM requirements.	Final construction drawings or equivalent or assessor site inspection report and photographic evidence. Daylight calculations, where not provided at design stage or updated. Confirmation from the design team that daylighting is in accordance with national best practice daylighting guidelines or BREEAM requirements.
Direct sunlight to windows		
6–7	Design drawings and calculations (manual or computer simulated). OR Relevant section or clauses of the building specification or contract confirming BREEAM requirements.	Where not provided at design stage or updated, calculations (manual or computer simulated). Assessor site inspection report and photographic evidence. OR Final construction drawings or equivalent.
View out		
8–9	Window schedules, calculations and design drawings with marked up floor plans depicting relevant zones and sight lines.	Assessor site inspection report and photographic evidence. OR Final construction drawings or equivalent. Updated calculations where required.
Evaluating glare from daylight		
10–11	Design drawings and calculations.	Assessor site inspection report and photographic evidence. OR Final construction drawings or equivalent. Updated calculations where required.

Definitions

Adequate view out

BREEAM defines an adequate view out as a view of a landscape or buildings (rather than just the sky) at seated eye level (1.2m) within the relevant building areas and should ideally be through an external window. A view into an internal courtyard or atrium will comply provided the distance from the opening to the back wall of the courtyard or 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.

Computer simulation modelling

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

Illuminance

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

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.

Reflectance

The ratio of the luminous flux reflected from a surface to the luminous flux incident on it.

Relevant building area – Daylighting

For BREEAM, this is defined as areas within the building where good daylighting is of benefit to the building users if it is an occupied space.

This includes the following, specifically stated because they are often omitted:

1. Sports hall exercise spaces
2. Laboratory areas (unless the type of research that will be carried out requires strictly controlled environmental conditions, such as the exclusion of natural light)
3. Self-contained flats
4. Kitchen and catering areas
5. General communal areas
6. Small offices (including those within residential buildings and residential institutions)
7. Meeting rooms (including those within residential buildings and residential institutions)
8. Leisure areas
9. Any area that may involve close up work.

However, this excludes the following (where present):

1. Media, arts production, SEN sensory spaces, x-ray rooms and other areas requiring strictly controlled acoustic or lighting conditions.
2. Clinical areas with controlled environmental conditions, e.g. operating theatres, delivery rooms or pathology. However, BREEAM strongly advises that the benefits from daylighting and view out are seriously considered when designing areas of critical and intensive care in healthcare buildings.

Relevant building area – Direct sunlight

For direct sunlight, only occupied living areas within the unit are required to assess the provision of direct sunlight. For example, within a healthcare building this would include in-patient bedrooms and day care living rooms.

Relevant building area – Glare control

Glare control criteria apply to areas of the building where resultant glare could be problematic for users. This includes, but not exclusively:

- Areas that have been designed to contain or use workstations or projector screens (such as offices, study bedrooms, libraries, facility management offices and reception desks).
- Areas where people must spend time in fixed locations and cannot change their viewing direction (such as classrooms and hospital wards).
- Sports halls.
- Areas where occupants are expected to spend a significant amount of time in the day (such as care home bedrooms).

Building areas described above should not be assessed when they are excluded for the daylight and view out criteria.

Relevant building area – View out

The aim of the view out criteria is to allow occupants to refocus their eyes from close work. Relevant areas are spaces where close work in a fixed position is carried out for sustained periods of time. The view out criteria is therefore not applicable to occupied areas such as meeting rooms, or other spaces where such close work is not being carried out.

BREEAM defines relevant building areas requiring a view out to include spaces where close work in a fixed position is carried out for sustained periods of time:

1. There are or will be workstations or benches or desks for building users.
2. Close work will be undertaken, or visual aids will be used.
3. Occupants spend a significant amount of time, and a view out is deemed to be of benefit to the building occupants, this includes:
    a. Bedrooms (Residential care home)
    b. Living rooms (Residential institution – long-term stay, and Residential)

Excluded areas for view out might include:

- Conference rooms, meeting rooms, lecture theatres, sports halls, acute SEN rooms, kitchens.
- Any spaces where the exclusion or limitation of natural light is a functional requirement (such as laboratories or media spaces).
- Individual booths or enclosed workstations that are intended for temporary non-permanent work.
- Bedrooms where occupants mainly use the space for sleeping, such as in hospitality, residential institutions (long- and short-term stay) and bedrooms that are not specified above and in building type specific note 2.1.

Relevant spaces – View out

A distinct space that falls within the definition of 'relevant building area'.

Relevant unit – Direct sunlight

A relevant unit would be a distinct building or space intended for single residential-like occupancy type. Where units are self-contained, such as a house or flat each self-contained unit must be considered separately. Where there are shared communal areas such as in a residential care home, then the whole care home can be considered one relevant unit. In a healthcare scenario, a healthcare ward that overnight patients have direct access to would be considered one unit.

Surrounding wall area

Surrounding wall area refers to the internally measured area (in m^2) of the external wall on which the window or opening is located, including the area of the window or opening itself.

Working plane

The CIBSE SLL Lighting Handbook and the CIBSE SLL Code for Lighting define the working plane or the reference plane as the plane at which work is normally done.

Additional information

None.

Hea 02 Electric light

(all buildings)

Aim

To ensure artificial lighting and occupant controls are considered at the design stage to ensure best practice in visual performance, visual comfort, and overall wellbeing for building occupants.

Overview

Assessment type	Credits available	Minimum standards	Applicable assessment criteria
Part 1: Fabric and structure	0	None	Not applicable
Part 2: Core services	1	None	1–4 (see ref 1.0 and 1.1)
Part 3: Local services	2 + 1 exemplary	None	All (see ref 1.0)
Part 4: Interior design	0	None	Not applicable

Assessment type specific notes

Ref	Assessment type specific note
1.0	**External lighting** Where no external light fittings are specified (either separate from or mounted on the external building façade or roof), the criteria relating to external lighting do not apply. When internal lighting is applicable, the credit can be awarded based on compliance with criteria 2–3. For Part 2 assessments when internal lighting is not applicable (see ref 1.1 below) the credit is not applicable, and the issue is filtered out.
1.1	**Part 2 – Core area fit out** If a Part 2 assessment has relevant areas – such as core areas – that are fitted out with internal lighting systems, then criteria 2 and 3 on internal lighting are applicable. If not, the internal lighting criteria are filtered out.

Building type specific notes

Ref	Building type specific note
2.0	**Hospitality – lighting levels in hotel bedrooms** Internal lighting levels in hotel bedrooms will not usually need to conform to national best practice levels for offices as these spaces are not generally used as a workspace. However, if hotel bedrooms, or rooms within a hotel suite, are intended to be used as workspaces, similar to a small office, the lighting levels should conform to national best practice levels for this type of space.
2.1	**Lighting control – Healthcare, Residential institutions, and Hospitality** To meet criterion 10, flicker must be met across entire dimming range, down to minimum specified dimming level as set out in M3.1. The dimming ranges in alternative standards in M1 cannot be used. This is because residential type assets regularly use the full dimming range, often before sleep and prevention of flicker during this period should be met.
2.2	**Prison buildings** **Cells:** Lit to a maintained illuminance of 200 lux at table top level. In addition, there must be the facility (using, for example, dimming, step switching or separate task and general lighting) for the occupant of the cell to select a lower level of general lighting if required. **Exercise yards:** Lit to a maintained illuminance of at least 10 lux. However, if such spaces are, or will be, used as sports facilities they must be lit to a maintained illuminance of 100 lux.

Assessment criteria

Prerequisite – Flicker

1 All lighting should be designed to minimise flicker and stroboscopic effects (see M1). This is applicable to all internal and external lighting.

One credit – Internal and external lighting

Internal lighting

2 Internal lighting in all relevant areas of the building is designed to comply with all applicable recommendations in EN 12464-1:2021[7], SLL Code for Lighting 2022[8] or an approved alternative national standard. Internal lighting should be appropriate to the tasks undertaken, accounting for building user concentration and comfort levels. This can be demonstrated through a lighting design strategy that provides lighting parameters in accordance with national best practice lighting guides (see CN2 on page 112). Compliance criteria must include, as applicable for each type of application:

- 2.a Illuminance levels and uniformity
- 2.b Glare limits
- 2.c Colour appearance (where standard recommendations exist)
- 2.d Colour rendering

3 For areas where computer screens are regularly used, specific confirmation is required that the lighting has been designed to limit the potential for glare in accordance with a numerical glare limit specified within national best practice lighting guides. These should include:

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

External lighting

4 All external lighting located within the construction zone is specified in accordance with EN 13201 series (parts 1 to 5)[9], [10], [11], [12], [13] and EN 12464-2:2024[14]. External lighting should enable users to perform outdoor visual tasks efficiently and accurately, especially during the night. This can be demonstrated through a lighting design strategy that provides lighting parameters in accordance with national best practice lighting guides (see CN2 on page 112). Compliance criteria should include, as applicable for each type of application:

- 4.a Illuminance / luminance levels and uniformity
- 4.b Glare limits
- 4.c Colour rendering

One credit – Zoning and occupant control

5 Internal lighting is zoned to allow for occupant control in accordance with the criteria below for relevant areas present within the building, as applicable:

- 5.a Workstations adjacent to windows or atria and other building areas are separately zoned and controlled.
- 5.b In office areas where furniture layout is known: zones of no more than four workplaces.
- 5.c Seminar and lecture rooms: zoned for presentation and audience areas.
- 5.d Library spaces: separate zoning of stacks, reading and counter areas.
- 5.e Teaching space or demonstration area.

5.f Whiteboard or display screen.

5.g Auditoria: zoning of seating areas, circulation space and lectern area.

5.h Dining, restaurant, café areas: separate zoning of servery and seating or dining areas.

5.i Retail: separate zoning of display and counter areas.

5.j Bar areas: separate zoning of bar and seating areas.

5.k Day rooms, waiting areas: zoning of seating and activity areas and circulation space with controls accessible to staff.

5.l Hotel bedrooms: separate zoning of hallway, bathroom, desk and sleeping area (where present in the room).

6 Where automatic lighting controls are used for energy efficiency reasons, manual override must be provided.

7 In addition, the building type criteria in Table 18 below (where relevant).

Table 18: Building-specific zoning and control requirements

Building type	Internal and external lighting requirements
Education buildings	Manual lighting controls are easily accessible for the teacher while teaching and on entering or leaving the teaching space. Manual lighting controls need only be provided for staff, not the children.
Law court buildings	Separate zoning is also provided for the following areas (as a minimum): 1. Judge's or magistrate's bench 2. Dock 3. Jury area 4. Public seating area Lighting control of the zones in the above spaces, and the court as a whole, cater for the following settings: 1. Full lighting (to allow cleaning etc.). 2. Normal lighting (for court sessions). 3. Dimmed (for the purpose of showing audio-visual evidence, but allowing enough light for note taking).
Internal areas excluded from the lighting zone requirements	The following internal areas are excluded from the lighting zone requirements: 1. Media and arts production spaces. 2. Sports facilities (exercise spaces only, including hydrotherapy and physiotherapy areas).
Auditoria spaces	Areas used for teaching, seminar or lecture purposes have lighting controls specified in accordance with 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: 1. Full normal lighting (to allow for entry and exit, cleaning etc.). 2. Demonstration area lighting off and audience area lighting reduced to a low level (for the purpose of line slide projection, but allowing enough light for the audience to take notes). 3. All lighting off (for the projection of tone slides, colour slides, and for the purposes of visual demonstrations or performances). 4. Separate localised lectern lighting.

One exemplary credit – Lighting control

8 Lighting in each control zone within an occupied space can be manually dimmed by occupants down to 20% or less of the maximum light output using lighting control interfaces positioned in accessible locations.

9 Lighting in each control zone within an occupied space can be colour tuned over a correlated colour temperature range from 2700K or less to 4000K or more, with automatic controls set to limit the correlated colour temperature in the afternoon and evening to 2700K or less.

10 All lighting should be designed to minimise flicker across their full dimming and colour tuning ranges (see M3.1).

Methodology

M1: Flicker and stroboscopic effects

All lighting (except for non-maintained emergency lighting), including light sources and separate control gear, must demonstrate compliance against one of the below:

1. Flicker and stroboscopic effects at full load (not dimmed) in line with Table 19, see M1.1 and M1.2

   Table 19: Flicker and stroboscopic effect limits

Location	Short-term flicker indicator (P_{st}^{LM})	Stroboscopic visibility measure (SVM)
EU and UK	≤ 1.0	≤ 0.4
All countries outside of EU and UK	≤ 1.0	≤ 1.0

2. IEEE 1789-2015 *IEEE Recommended Practices for Modulating Current in High-Brightness LEDs for Mitigating Health Risks to Viewers*
3. California Title 24, Joint Appendix JA10, Test Method for Measuring Flicker of Lighting Systems

Standards deemed equivalent by the project team can be submitted as per the Approved Standards process.

M1.1: European Union and UK – compliance

The following regulations are applicable in the EU and UK respectively:

— EU 2019/2020 (Single Light Regulation) and Ecodesign EU Directive 2009/125/EC

— UK SI 2010 No.2617 Ecodesign for Energy-Related Products Regulations

They mandate that lighting products must meet the flicker specification in Table 19 at full load (not dimmed) before they can be legally sold in the market.

For refurbishment and fit out projects, compliance must be demonstrated for all relevant lighting, even if projects are within the EU and UK.

M1.2: Locations outside of EU and UK – compliance

For the purpose of the BREEAM certification outside the EU and UK the original SVM value at ≤ 1.0 can be considered, in line with Table 19, unless there is a stricter requirement in a relevant national standard. Relevant test methods include but are not exclusive too:

— Short-term flicker indicator (P_{st}^{LM}): IEC TR 61547-1:2020

— Stroboscopic effects (SVM): IEC TR 63158:2018

M2: Internal and external lighting

M2.1: Occupancy or workstation layout

The limit of four workspaces is indicative of the required standard but is not a fixed requirement. Where there is justification for this to be increased to fit with the adopted lighting strategy, this may be accepted provided that the assessor is satisfied that the aim of this criterion is upheld, i.e. that there is suitable zoning or control of lighting to enable a reasonable degree of occupant control over lighting in their personal work area. The relevant design team member, e.g. lighting consultant, should set out how this is to be achieved in such an instance.

Where occupancy or workstation layout is not known, lighting control can be zoned based on 40 m² grids, i.e. an assumption of 1 person or workspace per 10 m².

M3: Lighting control

M3.1: Flicker in dimming and colour tuning ranges

In criterion 10, flicker must be demonstrated to have been met across the dimming and colour tuning ranges. To meet this, the performance criteria set out below in Table 20 must be demonstrated by one of the following approaches:

1. In-situ testing, including a mock up test – This must include product testing of the lighting system, including the combination of driver and light sources.
2. Lab testing – This must include product testing of the lighting system, including the combination of driver and light sources.
3. Driver data sheets – These must confirm the dimming range, the flicker performance across the entire operating window (dimming range), and confirmation that products are installed in line with the manufacturer recommendations.

Table 20: Performance criteria for flicker in dimmed and colour tuned states

Item	Description
Dimming range	50% light output and minimum specified dimming level (light output), or as specified within an alternate standard in M1.
Colour range	The above dimming range in each addressable channel must be assessed.
Performance requirement	Any flicker metric (i.e. P_{st}^{LM} or percentage flicker) and level of performance matching requirements in a standard listed in M1.
Note: The standards listed in M1 do not meet all the requirements for this criterion as they do not cover colour changes. In addition, only the California Title 24, Joint Appendix JA10 and IEEE 1789-2015 set performance requirements on flicker in dimming ranges.	

Compliance notes

Ref	Terms	Description
Flicker and stroboscopic effects		
CN1	National best practice standards	National or local equivalent for the flicker criteria can be used; however, this must be approved by BRE Global. The Approved Standards list can be used to propose a new standard.
Internal and external lighting		
CN2	National best practice lighting guides	Please refer to Approved Standards to locate the appropriate national best practice standards in the country of assessment. Alternatively, standards deemed equivalent by the project team can be submitted as per the process outlined in the Assessor Operations manual. Where appropriate lighting guides do not exist for a country, the design team should demonstrate compliance with the European standards: — EN 12464-1 Light and lighting – Lighting of workspaces (current version dated 2021) — EN 12464-2 Lighting of work places – Part 2: Outdoor work places (current version dated 2024)
CN2.1	Lighting levels for areas where computer screens are regularly used	Projects can specify 300 lux instead of what is prescribed in EN 12464-1. This is as per CIBSE Lighting Guide 7[15].
CN2.2	External lighting – architectural façade/decorative lighting	Architectural façade or other decorative lighting, which does not provide users with lighting to perform tasks outdoors, does not need to be included in the assessment of external lighting.
CN2.3	Limiting the potential of glare (criterion 3)	CIBSE Lighting Guide 7 – Sections 2.5, 2.15 to 2.17, 2.22, and 6.10 to 6.20 can be followed to demonstrate compliance against criterion 3.
CN2.4	Alternative to EN	BS 5489-1:2013 Lighting of roads and public amenity areas can be used instead of EN

Ref	Terms	Description
	13201 series (Parts 1 to 5) for projects in the UK	13201 series (parts 1 to 5).
Zoning and control		
CN3	Small spaces	Buildings consisting entirely of small rooms or spaces (less than 40 m²) which do not require any subdivision of lighting zones or control will meet the zoning criteria by default.
CN3.1	Zoning rooms not listed	For zoning rooms or spaces not listed within criteria 5 and 7, the assessor can exercise an element of judgment when determining whether what is specified is appropriate for the space, given its end use and the aim and criteria of this BREEAM issue.
CN3.2	Task lighting	Lighting zoning criteria are applicable to both general lighting and task lighting (where present). Task lighting is only considered in fully fitted projects, where they are integrated into the workstations. And can be controlled individually by occupants, and can be centrally controlled by building management, enabling automatic switch off. Portable task lights are not accepted. Task lighting must connect to the building systems in a way that prevents removal by general users.
CN3.3	Dimming control	Localised dimming controls installed in line with the criteria, along with a master on/off switch, can be considered as meeting the aim of the requirement for 'controls' in open plan offices.
CN3.4	Handheld remote controls	Remote control light switches can be considered as compliant, on the basis that these are provided in sufficient numbers/locations to meet the aim of the criteria.
CN3.5	Exemplary lighting control exemptions	The exemplary level criteria apply only to lighting zones in the asset where: — Zones will benefit from dimming or colour tuning control. — Dimming or colour tuning does not interfere with the function of the space. Where lighting zones do not have dimming or colour tuning controls fitted, these must be clearly evidenced and justified.
CN3.6	PIR in circulation spaces	PIR controls can be deemed compliant in circulation spaces such as corridors. In this instance 'separate occupant controls' are not required. The requirement for user control is so that the building users can have direct control over their immediate work environment to ensure it is suitable for their personal needs. In circulation spaces, occupancy is transient and PIR control in these spaces is acceptable.
CN3.7	Historic buildings	In some cases, an explicit requirement from the relevant conservation authority (e.g. local authority conservation officer) may require the retention of existing listed lighting features which prevents zoning of lighting in accordance with criterion 5. In such cases, evidence should be provided from the conservation officer, and measures should be considered to ensure that adequate control is provided for existing retained lighting zones and measures adopted for the provision of task lighting as relevant for the function type and as is feasible within the constraints as applied by the conservation officer.

Evidence

Criteria	Interim design stage	Final post-construction stage
Flicker and stroboscopic effects		
1	Design drawings or lighting schedules. OR Relevant section or clauses of the building specification or contract. OR A letter of formal confirmation of compliance from the building services engineer or lighting designer.	Assessor site inspection report and photographic evidence. Final construction or equivalent lighting schedules and lighting layout plans. Manufacturer's product data sheets.

Criteria	Interim design stage	Final post-construction stage
	Where luminaire specifications are known, manufacturer's product data sheets.	
Internal and external lighting, Zoning and occupant control, Lighting control		
2–10	Design drawings, lighting schedules and lighting control strategy. OR Relevant section or clauses of the building specification or contract. OR A letter of formal confirmation of compliance from the building services engineer or lighting designer.	Assessor site inspection report and photographic evidence. Documentary evidence to confirm compliance such as final construction or equivalent lighting schedules, lighting layout plans, lighting control strategy, lighting calculations or light testing results. A letter of formal confirmation of compliance from the building services engineer or lighting designer. Where relevant, formal confirmation that flicker requirements are met across dimming and colour tuning ranges, through in-situ testing, lab testing, or driver data sheets.

Definitions

Computer simulation

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

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.

Illuminance

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

Occupied space

A room or space within the assessed building that is likely to be continuously occupied for 30 minutes or more by a building user.

Reflectance

The ratio of the luminous flux reflected from a surface to the luminous flux incident on it.

Relevant building area – Internal and external lighting

Relevant areas for internal lighting should cover all the relevant areas listed within the standard used, i.e. EN 12464-1:2021 (Table 9 – 61).

Where no external light fittings are specified (either separate from or mounted on the external building façade or roof), the criteria relating to external lighting do not apply and the credit can be awarded based on compliance with the internal lighting criteria.

Separate zoning – Occupant control

Light switches or controls for a particular area or zone of the building that can be accessed and operated by the individuals occupying that area or zone. Such controls will be located within, or within the vicinity of, the zone or area they control.

The relevant areas for the criteria apply only to areas where users are expected to have control. For instance, this means that areas intended for the general public, or a shop floor would not be expected to have lighting controls.

Uniformity

The uniformity is the ratio between the minimum illuminance on the working plane within a room and the average illuminance on the same working plane.

Working plane

CIBSE SLL Lighting Handbook and the CIBSE SLL Code for Lighting define the working plane or the reference plane as the plane at which work is normally done.

Additional information

Flicker and stroboscopic effects

Further information on flicker and stroboscopic effects can be found in SLL Factfile 17: Temporal lighting artefacts (2021).

Internal and external lighting levels, zoning and control

Relevant industry standards for lighting design

For preschools and schools, the following can be considered a relevant industry standard for lighting design:

— Building Bulletin 90: Lighting Design for Schools[16]

For care homes housing people with dementia the following standard can be used instead of the SLL Code for Lighting:

— Design Lighting for People with Dementia, University of Stirling, Stirling, 2013.

For residential institution (long-term stay), CIBSE SLL LG9[17] can be considered as a relevant standard in addition to, or instead of, SLL Code for Lighting 2022.

Illuminance levels specified in the SLL Code for Lighting 2022 align with BS EN 12464-1.[18]

BREEAM has not attempted to list all appropriate industry standards. Any recognised collaborative industry or sector best practice standard or guidance that sets levels appropriate to the tasks undertaken, accounting for building user concentration and comfort levels, can be considered an appropriate industry standard for the purposes of this BREEAM issue.

Hea 03 Non-visual effects of light

(all buildings)

Aim

To ensure the non-visual effects of light are considered to promote positive impacts on psychology and physiology of the building occupants through a healthy circadian rhythm.

Overview

Assessment type	Credits available	Minimum standards	Applicable assessment criteria
Part 1: Fabric and structure	0	None	Not applicable
Part 2: Core services	0	None	Not applicable
Part 3: Local services	1	None	All (see ref 1.0 and 1.1)
Part 4: Interior design	0	None	Not applicable

Assessment type specific notes

Ref	Assessment type specific note
1.0	**Speculative end use** Where the building, assessed under Part 3, is speculative and therefore the final layout is not defined (e.g. only open plan is provided in each tenanted space), the required areas of each open plan space should meet the criteria. Criterion 2.a is not applicable to speculative assessments. When using criterion 2.b and fixed positions are unknown, both seated and standing eye heights must be assessed (see CN1.4). Where it is possible to designate separable ancillary areas that would be required in the space (such as toilets or server rooms), these can be excluded from the calculation (see CN1.5).
1.1	**Criterion 1** When the assessment does not cover Part 1 or 4 and the daylight criteria in Hea 01 is not applicable, criterion 1 is not applicable.

Building type specific notes

Ref	Building type specific note
-	None

Assessment criteria

One credit – Non-visual effects of light

1 Achieve at least one credit for 'Daylighting' in Hea 01 Natural light.

2 All relevant areas achieve one of the below, as applicable:

2.a Where occupant positions are known and fixed (see M1.1): All positions in all relevant building areas receive a vertical illuminance of at least 250 lux melanopic EDI at occupant eyes for at least four hours during the daytime (beginning by noon at the latest).

2.b Where occupant positions are unknown or variable (see M1.2): Cylindrical illuminance at eye height across each relevant building area corresponds to at least 250 lux melanopic EDI for at least four hours during the daytime (beginning by noon at the latest).

3 Electric lighting systems and controls are in place to adjust the flux and spectral output of the emitted light over time (colour tuning) so that melanopic EDI at occupant eye level can be reduced in the afternoon and evening, as relevant for each type of application.

Residential areas (Healthcare, Residential institutions, Prisons, and Hospitality)

4 For residential areas within a building, systems and controls are in place to ensure that no more than 10 lux melanopic EDI for a period of three hours before bedtime and no more than 1 lux melanopic EDI during sleep time are achieved at occupant eye level in all relevant building areas where residential occupancy type is expected (see Definitions).

Methodology

M1: Non-visual effects of light

Non-visual effects of light can be quantified through melanopic Equivalent Daylight Illuminance (EDI), expressed in lux. This is the illuminance from daylight that produces a melanopic irradiance, or a circadian stimulation, equivalent to that of the light source considered. It can be calculated or measured based on illuminance and spectral power density using the CIE S 026 Toolbox (cie.co.at/publications/cie-system-metrology-optical-radiation-iprgc-influenced-responses-light-0).

For each seated or standing occupant location in all relevant building areas, daylight should be the preferred light source for achieving the 250 lux melanopic EDI criterion during the daytime (criterion 2). To calculate the daylight contribution, see M1.3. In addition to daylight, electric lighting may also be used to achieve the criterion. For appropriate methodology on electrical lighting contribution, see M1.4.

M1.1: Known and fixed occupant positions

Where fixed seated or standing positions are known, and criterion 2.a is used, only those positions and viewing directions need to be assessed for compliance against the daylight and electrical light contribution (M1.3 and M1.4) using vertical illuminance at the eye.

M1.2: Variable or not known positions

Where positions are variable or not known, and criterion 2.b is used, cylindrical illuminance at eye height, seated and/or standing (see CN1.4), must be determined in each relevant building area. A calculation grid as defined in Guidance Note 50 must be used for each relevant area. The daylight and electric lighting contributions should be determined at all calculation grid points in the relevant areas. To comply with criterion 2.b, cylindrical illuminance must meet the target at each calculation grid point.

Examples of spaces with variable occupant positions include areas where occupants are not confined to static locations during activities. These can be healthcare facilities where staff move around patients, retail spaces where shopping assistants move about, industrial buildings where staff shift between different positions, and other similar environments.

M1.3: Daylight contribution

Following the procedures described in Guidance Note 50, daylight contribution should first be determined through computer-based calculations of daylight illuminance (expressed in lux) at occupant eye level (see CN1.4). This can be vertical illuminance at the eye for each occupant position where occupant positions are fixed and known, or cylindrical illuminance at eye height across a calculation grid covering each relevant area where occupant positions are unknown or variable.

Calculations must be carried out for each occupied day in a typical year, and at hourly steps over four hours during the daytime beginning by noon at the latest. For each calculation point, the lowest hourly daylight illuminance value calculated (expressed in lux) should be retained and deducted from the target value of 250 lux melanopic EDI. If the result is a positive value, it should be taken as the daytime melanopic EDI target for the electric lighting system.

> For example, the lowest hourly daylight illuminance calculated at occupant eye level for a known and fixed seating location is 50 lux. In order to achieve the 250 lux melanopic EDI target, 200 lux melanopic EDI must be provided by electric lighting at occupant eye level for this location.

Note: Daylight illuminance (lux) is directly equivalent to melanopic EDI.[19]

M1.4: Electric lighting contribution

The contribution from electric lighting can be determined through in situ measurements or computer-based calculations of vertical melanopic EDI at eye level for each seating location where occupant positions are fixed and known, or cylindrical melanopic EDI at eye height across a grid covering each relevant area where occupant positions are unknown or variable.

Measurements should prioritise melanopic EDI via spectral power density (using a spectrometer) although illuminance (using an illuminance meter) would also be acceptable see M1.4.1 and M1.4.2 respectively. Computer-based calculations will typically include illuminance.

Daylight must be completely excluded from measurements and calculations of electric lighting (spectral power density and/or illuminance).

M1.4.1: Measurement of melanopic EDI

Vertical melanopic EDI can be measured in situ using a spectrometer that records spectral power density and converts the readings into melanopic EDI. Alternatively, if the spectrometer only records spectral power density without converting it into melanopic EDI, the spectral power density measurement results will need to be entered into the CIE S 026 Toolbox to determine the corresponding melanopic EDI values. The International Commission on Illumination (CIE) provides user guides and introduction videos in this respect (available from: cie.co.at/publications/cie-system-metrology-optical-radiation-iprgc-influenced-responses-light-0).

Where in situ measurements of cylindrical melanopic EDI are taken, a simplified methodology may be used. For each grid point, vertical melanopic EDI can be measured as above in all four cardinal directions corresponding to the main axes of the space, and the mean average of the four measurement results can be taken to represent cylindrical melanopic EDI.

M1.4.2: Measurement of illuminance

Where melanopic EDI or spectral power density measurements are not possible, illuminance can be measured or calculated via computer modelling. The illuminance measurement results will need to be multiplied by the melanopic Daylight Efficacy Ratio (DER) corresponding to the type of electric lighting used in each relevant building area. In this situation, the calculation cannot use the CIE S 026 Toolbox but instead should apply the melanopic DER given in Table 21 below for the corresponding type of electric lighting. The multiplication results will constitute the melanopic EDI values for electric lighting.

Table 21: Typical melanopic DER for common types of electric lighting

Type of electric lighting	Typical melanopic DER
LED, warm white, CCT 2700K	0.42
LED, warm white, CCT 3000K	0.47
LED, neutral white, CCT 4100K	0.63
LED, cool white, CCT 5700K	0.72
Fluorescent lighting, warm white, CCT 3000K	0.40
Fluorescent lighting, neutral white, CCT 4000K	0.56
Fluorescent lighting, cool white, CCT 5000K	0.68
Incandescent lighting	0.50

Notes:

1. The correlated colour temperature (CCT) should be as per product datasheets or measured in situ using a spectrometer.
2. Where the measured CCT differs from the values listed above, the melanopic DER corresponding to the nearest CCT listed may be used. Alternatively, for higher accuracy, the melanopic DER may be determined through interpolation or extrapolation.
3. If there are other types of electric lighting not listed above, the CCT value should be determined and the corresponding values for fluorescent lighting should be used.

Following on the example, where the lowest hourly daylight contribution at occupant eye level for a known and fixed seating location is 50 lux, 200 lux melanopic EDI of electric lighting is needed to meet criterion 2.a. The room assessed uses 'LED, neutral white, CCT 4100K' which has a melanopic DER of 0.63 (see Table 21 above). The measured illuminance at occupant eye level from electric lighting at the seating location is 500 lux. Therefore, the following can be confirmed:

The melanopic EDI from the electric lighting system = 500 × 0.63 = 315 (lux melanopic EDI)

The overall melanopic EDI for the seating location at occupant eye level = 50 + 315 = 365 (lux melanopic EDI)

This is greater than the 250 lux melanopic EDI and therefore this seating location meets criterion 2.a.

This process will need to be repeated for all other known and fixed seating locations in the relevant building area.

The same lighting system must also be able to meet criterion 3 and 4. In the case of a residential institution asset type, the electric lighting system must not exceed the melanopic EDI benchmarks provided for three hours before bedtime and during sleep, respectively. The contribution from all forms of electric lighting present in each relevant building area should be accounted for.

For example, the lighting is dimmed and colour tuned to a 'LED, warm white, CCT 2700K' which has a melanopic DER of 0.42 (see Table 21 on the previous page) three hours before bedtime in a residential care home. The measured illuminance at occupant eye level is 50 lux.

The melanopic EDI from the electric lighting system = 50 × 0.42 = 21 (lux melanopic EDI)

This is higher than the 10 lux melanopic EDI. To meet the criteria, the lighting system would have to reduce the CCT or dimmed further to reduce the illuminance at occupant eye level.

Compliance notes

Ref	Terms	Description
CN1	Relevant building areas – occupation hours	Criterion 2 should only be considered for occupation during daylight hours. Where the relevant building areas are occupied during nighttime hours only this criterion is not applicable. The remaining criteria are still applicable.
CN1.1	Occupant age	Criteria 1–4 are designed for a typical healthy adult. Currently, there is not enough evidence to justify changing the melanopic EDI criteria to suit other age groups. Where young children will occupy relevant building areas, the daytime level of 250 lux melanopic EDI must be achieved from daylight alone. There is no change in criteria for older adults.
CN1.2	Bedtime and sleep time – timeframes	Assessor and design team judgement can be used when defining the bed and sleep time frames. Where needed a bedtime of 23:00 and a sleep time of 7 hours can be assumed.
CN1.3	Areas exempt	Following the principles outlined in Section 5.3.5 of ISO/CIE 8995-1:2025, a band near the wall may be excluded unless occupants are expected to be in this zone for a significant amount of time (i.e. > 2 hours a day).[20]
CN1.4	Eye height	Eye height is considered to be 1.2 m above floor level for seated positions and 1.6 m when standing. Where fixed positions are unknown, both seated and standing eye heights must be assessed.
CN1.5	Exclusion of non-relevant areas	Only relevant areas within rooms should be assessed. However, spaces such as circulation routes or other transient spaces within a relevant area can only be excluded if the route or area is clearly defined by the building layout. Features of the building layout which may be considered as dictating a function area would include, for example, the position of doors or fixed furniture such as a reception desk or canteen servery.

Evidence

Criteria	Interim design stage	Final post-construction stage
Non-visual effects of light		
All	A letter of formal confirmation of compliance from the building services engineer or lighting designer. Lighting product datasheets and schedules or specification. Documentary evidence to confirm the measured or calculated inputs of illuminance or spectral power density. AND The calculated lux melanopic EDI confirming criteria has been achieved.	Assessor site inspection report and photographic evidence. Final construction drawings or equivalent, lighting product data sheets and schedules. Updated calculation or measurement inputs and results, where required. Formal confirmation of compliance from the building services engineer or lighting designer.

Definitions

Computer simulation

Software tools that can be used to model more complex room geometries for daylighting and electric lighting.

Cylindrical illuminance

Average illuminance on the curved surface of a small imaginary cylinder with a vertical axis, unless stated otherwise. It does not include light falling onto the ends of the cylinder. It can be calculated using specialist software.

Illuminance

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

Melanopic Daylight Efficacy Ratio (DER)

Metric used to quantify the effectiveness of a light source in stimulating the melanopic photoreceptors in the human eye, relative to its ability to provide visible light for general vision. It is defined as the ratio of melanopic irradiances for this light source to that for the CIE standard daylight illuminant D65 at the same visual illuminance.(21)

Melanopic Equivalent Daylight Illuminance (EDI)

The illuminance from the CIE standard daylight illuminant D65 that produces an equal melanopic irradiance as the light source considered. Measured in lux.

Non-visual effects

Non-visual effects of light, also referred to as non-image-forming (NIF) or non-visual (NV) responses to light, are the physiological effects of light that are distinct from visual perception. These effects can include light-induced melatonin suppression; pupillary light reflex; circadian rhythm regulation; influence on heart rate and alertness; or impacts on mood and attention.

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.

Relevant areas – Non-visual effects

BREEAM defines relevant areas for non-visual effects to include areas of the building where:

1. There are or will be workstations, benches or desks for building users.
2. Close work will be undertaken.
3. Where occupants are expected to be for over 2 hours of the day and move about a space. Such as healthcare facilities where staff move around patients, retail spaces where shopping assistants move about, industrial buildings where staff shift between different positions, and other similar environments.

Exclusions apply to the following:

- Only the relevant areas listed above within a room need to comply, un-occupied areas in the same room such as corridors or storage areas are excluded (see CN1.5).
- See CN1.3
- The following areas exempt from the daylight criteria can be excluded (where present):
    - Media, arts production, SEN sensory spaces, x-ray rooms and other areas requiring strictly controlled acoustic or lighting conditions.

Residential areas

Residential areas within a building include any room intended for long term residential use, including sleep and long-term occupation.

Spectral power density

A measure of the power per unit area emitted by a light source per unit wavelength. It describes how the light emitted by a light source is distributed across different wavelengths of the visible spectrum. Typically measured in watts per square metre per nanometre ($W/m^2/nm$).

Additional information

CIE S 026 Toolbox

The International Commission on Illumination provides user guides and introduction videos to support the use of the recommended CIE S 026 Toolbox (cie.co.at/publications/cie-system-metrology-optical-radiation-iprgc-influenced-responses-light-0).

Circadian lighting effects on health and wellbeing

Report on circadian lighting effects on health and wellbeing RI01: Circadian lighting (www.cibse.org/knowledge-research/knowledge-portal/research-insight-01-circadian-lighting).

Flicker in dimmable lighting

Flicker is of particular concern for lighting in dimmed states, such as required in criterion 4. Lighting designers should consider using the exemplary 'lighting control' criteria in Hea 02 Electric light to ensure that flicker does not negatively impact the building occupants and the overall lighting strategy.

Hea 04 Indoor air quality

(all buildings)

Aim

To recognise and encourage a healthy internal environment with excellent indoor air quality.

Overview

Assessment type	Credits available	Minimum standards	Applicable assessment criteria
Part 1: Fabric and structure	up to 2	Pass, Very Good	1–4, 7 (see ref 1.0)
Part 2: Core services	up to 2	Pass, Very Good	1–7 (see ref 1.1)
Part 3: Local services	up to 2	Pass, Very Good	1–6 (see ref 1.2)
Part 4: Interior design	up to 5 + 3 exemplary	Pass, Very Good	1–2, 8–18
EU Taxonomy	-	-	8–9

Assessment type specific notes

Ref	Assessment type specific note
1.0	**Part 1 – Ventilation** The Ventilation credit is applicable to Part 1 assessments because there may be instances where the decisions made for the fabric and structure can have an impact on the ventilation strategy. For example, if a natural ventilation strategy is to be used, the criteria related to ventilation standards and the distance between openable windows and sources of external pollution would be relevant.
1.1	**Part 2 – Ventilation** Where there are no works to ventilation systems and Part 2 is being assessed, to achieve compliance, the development needs to do all it can to the existing ventilation system(s).
1.2	**Part 3 – Ventilation** Criteria 4 and 5 are applicable where there are newly specified or existing local ventilation systems within the refurbishment zone.

Building type specific notes

Ref	Building type specific note
2.0	**Industrial buildings** If the building will not contain any office or other occupied space, only the prerequisite within this issue applies. While the requirements apply to permanently or semi-permanently occupied offices, small administration areas, which are only used occasionally can be excluded.
2.1	**Industrial buildings** The aim of this issue is to encourage a healthy internal environment. For the operational areas of industrial buildings, the internal environment is dictated by health and safety requirements. This means that the BREEAM requirements should not be made applicable to them, and so the operational areas can be excluded in the assessment of Hea 04.

Assessment criteria

Prerequisite – No asbestos

1 In countries or jurisdictions where the use of asbestos in construction materials is not prohibited by law, the project demonstrates that no materials containing asbestos have been specified or installed as part of the refurbishment works.

One credit – Indoor air quality plan

2 A site-specific indoor air quality plan has been produced by a suitable IAQ professional and in accordance with Guidance Note 6 (GN06). This plan informs the design, specification, and installation to maximise improvement of indoor air quality during occupation. The plan must consider the following:

- 2.a Removal of highly contaminating sources.
- 2.b Dilution and control of other contaminant sources, including:
  - 2.b.i Air quality requirements of specialist areas such as laboratories, where present.
- 2.c Procedures for pre-occupancy flush out and purge ventilation.
- 2.d Third party testing and analysis.
- 2.e Maintaining indoor air quality in-use.
- 2.f Any relevant local or national authority plans or policies (for example, Air Quality Management Areas or Local Air Quality Action Plans).
- 2.g Protection of heating, ventilation and air-conditioning (HVAC) systems from sources of pollution during construction, refurbishment, or fit-out works, e.g. dust and debris.
- 2.h Measures to protect the indoor air quality of adjacent areas outside the immediate refurbishment or fit-out zone that may be affected by the works.

One credit – Ventilation

Refurbishment and fit-out works include measures to minimise the concentration and recirculation of pollutants in the building as follows:

3 Provide fresh air into the building in accordance with one of the best practice standards for ventilation listed below (for further guidance, see M1.1):

- 3.a ISO 17772-1:2017 Annex I
- 3.b EN 16798-1:2019 Annex B.3
- 3.c The national best practice standard for ventilation

4 Ventilation pathways are designed to minimise the ingress and build-up of air pollutants inside the building (see M1.3).

5 Where present, HVAC systems must incorporate suitable filtration to reduce infiltration of outdoor air pollutants into the indoor environment, as defined in EN 16798-3:2025 Section B.4.2.[22] The specified filters should achieve supply air classification of at least SUP 2. The level of filtration required is dependent on the quality of the outdoor air.

- 5.a Multiple-occupancy residential developments with ventilation or central air conditioning systems can demonstrate compliance with filter class of F7 or ePM_1 50%.

6 Occupied spaces have calibrated carbon dioxide (CO_2) or calibrated air quality sensors in specified areas, in line with M1.4 and:

- 6.a In mechanically ventilated buildings or spaces: sensors are linked to the mechanical ventilation system and provide demand-controlled ventilation to the space.

6.b In naturally ventilated buildings or spaces: sensors either have the ability to alert the building owner, manager or occupants when CO_2 levels exceed the recommended set point, or are linked to controls with the ability to adjust the quantity of fresh air, i.e. automatic opening windows or roof vents.

6.c The total number of sensors, and the net internal area of relevant areas covered by the sensors, is reported via the BREEAM Platform.

7 In countries or jurisdictions where smoking within buildings is not prohibited by law (see Definitions), a smoking ban covering all public and staff areas of the building is implemented, and 'No Smoking' signs are located in appropriate areas clearly visible to all occupants (i.e. common areas, offices and building entrances).

Up to two credits – Emissions from construction products

One credit

8 Three of the five product types meet the emission limits, testing requirements and any additional requirements listed in Table 23 and M2. Where wood-based products are not one of three selected product types, all wood-based products used for internal fixtures and fittings must be tested and classified as formaldehyde E1 class as a minimum (see CN2.2).

> Even if low emitting products are used, the air quality may still exceed the indoor air quality limits, depending on the amount of material used, the volume of the space, and the ventilation rate.

Two credits

9 All the product types meet the emission limits, testing requirements and any additional requirements listed in Table 23 and M2.

Up to two credits – Post-construction indoor air quality measurement

One credit

10 Criterion 2 has been achieved.

11 Post-construction indoor air quality measurement is carried out for the parameters listed in Table 22 by a suitable IAQ professional.

12 Sampling and analysis for each parameter is performed in accordance with the test method specified in Table 22 and M3.

13 If any measured concentration level exceeds the limits in Table 22, the project team confirms the measures that have or will be undertaken in accordance with the recommendations of the IAQ plan to reduce the levels to within the limits.

Two credits

14 Criteria 10-12 has been achieved.

15 The measured concentration for each parameter listed in Table 22 does not exceed the 'Concentration limit' specified and the measured values are reported via the BREEAM Platform.

Table 22: Post-construction indoor air quality performance criteria

IAQ parameter	Concentration limit (µg/m³)	Sampling & analysis test method
Formaldehyde	100	ISO 16000-2[23] , ISO 16000-3[24]
TVOC	300	ISO 16000-5[25] , ISO 16000-6[26] , ISO 16017-1[27]

Up to two exemplary credits – Emissions from construction products

One exemplary credit

16 At least four of the five product types listed in Table 24 on page 126 meet the emission limits, testing requirements and any additional requirements listed in Table 24 and M2.

Two exemplary credits

17 All product types meet the emission limits, testing requirements and any additional requirements listed in Table 24 and M2.

One exemplary credit – Emissions from furniture products

18 80% of in-scope furniture products by cost or number of units meet the maximum allowable concentration limits for VOC emissions in one of the following (see M4):

18.a ANSI/BIFMA e3 Furniture Sustainability Standard, Section 7.6.1 or 7.6.2.(28)

18.b California Department of Public Health (CDPH) Standard Method v1.2-2017, Table 4-1.

Checklists and tables

Table 23: Emission criteria by product type

Emission limit [1, 2]			Testing requirement
Formaldehyde	Total volatile organic compounds (TVOC) [3]	Category 1A and 1B carcinogens	
Interior paints and coatings			
≤ 0.06 mg/m³	≤ 1.0 mg/m³	≤ 0.001 mg/m³	EN 16402 (29) or ISO 16000-9 (30) or BS EN 16516(31) or CDPH Standard Method v1.2 (32) or ISO 16000-10 (33) (see CN2.5)
Additional requirements for interior paints and coatings (see M2.3)			
Meet VOC content limits (Table 25 on page 130). Paints used in wet areas (e.g. bathrooms, kitchens, utility rooms) should protect against mould growth (see M2.3).			
Wood-based products (including wood flooring)			
≤ 0.06 mg/m³	≤ 1.0 mg/m³	≤ 0.001 mg/m³	ISO 16000-9 or BS EN 16516 or CDPH Standard Method v1.2 or EN 717-1 (formaldehyde emissions only) (34) or ISO 16000-10 (see CN2.5)
Flooring materials (including floor levelling compounds and resin flooring)			
≤ 0.06 mg/m³	≤ 1.0 mg/m³	≤ 0.001 mg/m³	ISO 10580 (35) or ISO 16000-9 or BS EN 16516 or CDPH Standard Method v1.2 or ISO 16000-10 (see CN2.5)
Ceiling materials, wall materials, acoustic insulation and thermal insulation materials			
≤ 0.06 mg/m³	≤ 1.0 mg/m³	≤ 0.001 mg/m³	ISO 16000-9 or BS EN 16516 or CDPH Standard Method v1.2

Emission limit [1, 2]			Testing requirement
Formaldehyde	Total volatile organic compounds (TVOC) [3]	Category 1A and 1B carcinogens	
			or ISO 16000-10 (see CN2.5)
Interior adhesives and sealants (including flooring adhesives)			
≤ 0.06 mg/m³	≤ 1.0 mg/m³	≤ 0.001 mg/m³	EN 13999 (Parts 1-4) (36), (37), (38), (39) or ISO 16000-9 or BS EN 16516 or CDPH Standard Method v1.2 or ISO 16000-10 (see CN2.5)

Notes

1. Compliance with emission limits shall be demonstrated after 28 days in an emission test chamber or earlier as stipulated by the relevant testing requirements standard. The emission rate obtained from the chamber test method must be extrapolated to predict what the concentration would be in the air of the theoretical model or reference room (as detailed in the respective testing standard) and this extrapolated concentration compared with the emission limit in this table.
2. The emission limits in this table apply to the finished product, i.e. after any coating or other treatment process has been applied.
3. Where test results for a product exceed the TVOC emission limit, compliance with the above requirements can still be achieved where the test results demonstrate an R-value ≤ 1 after 28 days.

Table 24: Exemplary level emission criteria by product type

Emission limit [1, 2]				Testing requirement
Formaldehyde	Total volatile organic compounds (TVOC) [3]	Total semi-volatile organic compounds (TSVOC)	Category 1A and 1B carcinogens	
Interior paints and coatings				
≤ 0.01 mg/m³	≤ 0.3 mg/m³	≤ 0.1 mg/m³	≤ 0.001 mg/m³	EN 16402 or ISO 16000-9 or BS EN 16516 or CDPH Standard Method v1.2 or ISO 16000-10 (see CN2.5)
Additional requirements for interior paints and coatings (see M2.3)				
Meet VOC content limits (Table 25 on page 130). Paints used in wet areas (e.g. bathrooms, kitchens, utility rooms) should protect against mould growth (see M2.3).				
Wood-based products (including wood flooring)				
≤ 0.01 mg/m³	≤ 0.3 mg/m³	≤ 0.1 mg/m³	≤ 0.001 mg/m³	ISO 16000-9 or BS EN 16516 or CDPH Standard Method v1.2 or EN 717-1 (formaldehyde emissions only) or

Emission limit [1, 2] Formaldehyde	Total volatile organic compounds (TVOC) [3]	Total semi-volatile organic compounds (TSVOC)	Category 1A and 1B carcinogens	Testing requirement
				ISO 16000-10 (see CN2.5)
Flooring materials (including floor levelling compounds and resin flooring)				
≤ 0.01 mg/m³	≤ 0.3 mg/m³	≤ 0.1 mg/m³	≤ 0.001 mg/m³	ISO 10580 or ISO 16000-9 or BS EN 16516 or CDPH Standard Method v1.2 or ISO 16000-10 (see CN2.5)
Ceiling materials, wall materials, acoustic insulation and thermal insulation materials				
≤ 0.01 mg/m³	≤ 0.3 mg/m³	≤ 0.1 mg/m³	≤ 0.001 mg/m³	ISO 16000-9 or BS EN 16516 or CDPH Standard Method v1.2 or ISO 16000-10 (see CN2.5)
Interior adhesives and sealants (including flooring adhesives)				
≤ 0.01 mg/m³	≤ 0.3 mg/m³	≤ 0.1 mg/m³	≤ 0.001 mg/m³	EN 13999 (Parts 1-4) or ISO 16000-9 or BS EN 16516 or CDPH Standard Method v1.2 or ISO 16000-10 (see CN2.5)

Notes

1. Compliance with emission limits shall be demonstrated after 28 days in an emission test chamber or earlier as stipulated by the relevant testing requirements standard. The emission rate obtained from the chamber test method must be extrapolated to predict what the concentration would be in the air of the theoretical model or reference room (as detailed in the respective testing standard) and this extrapolated concentration compared with the emission limit in this table.
2. The emission limits in this table apply to the finished product, i.e. after any coating or other treatment process has been applied.
3. Where test results for a product exceed the TVOC emission limit, compliance with the above requirements can still be achieved where the test results demonstrate an R-value ≤ 1 after 28 days.

Methodology

M1: Ventilation

M1.1: Provision of fresh air for ventilation (all countries except UK)

It is the design team's responsibility to determine and apply the most appropriate method or option(s) for the project undergoing assessment. The appropriate calculation method, as outlined in either standard below must be used:

- ISO 17772-1:2017 Annex I or
- EN 16798-1:2019 Annex B.3

For both standards, either Category I or Category II (high to medium) Indoor environmental quality input values must be used.

Supply air for buildings subject to human occupancy shall consider the expected emissions from indoor sources and from the ventilation system itself to ensure that proper indoor air quality shall be achieved – as according to EN 16798-3:2025 Section 9.2.

Residential institution (long term stay) buildings

Both standards provide different options for selecting design ventilation rates:

- Total air change rate for the dwelling
- Extract air flows for specific rooms
- Supply air flows for specific rooms
- Design opening areas for natural ventilation

M1.2: Provision of fresh air for ventilation (UK only)

It is the design team's responsibility to determine and apply the most appropriate method or option(s) for the project undergoing assessment.

Education buildings

- Building Bulletin 101 or BS ISO 17772-1:2017 (excluding naturally ventilated buildings), whichever requires the higher performance.

Clinical areas with controlled environmental conditions

- HTM03-01 Specialised ventilation for healthcare premises (England, Wales and Northern Ireland), SHTM03-01 Ventilation for healthcare premises Part A: Design and Validation (Scotland).

  OR

- BS ISO 17772-1:2017 (excluding naturally ventilated buildings), whichever requires the higher performance.

All other buildings (mixed mode or mechanical ventilation)

- BS ISO 17772-1:2017 Annex I.

All other buildings (naturally ventilated)

- CIBSE AM10.

M1.3: Ventilation pathways

Location of ventilation intakes and airflows must be designed in accordance with the below methodologies. There are different methodologies for either mechanically ventilated and mixed mode buildings or naturally ventilated buildings.

Mechanically ventilated and mixed mode buildings

The design of air-conditioned and mixed mode buildings must minimise the build-up of air pollutants. Locations of ventilation intakes and airflow pathways should be designed in accordance with one or a combination of the following methods:

1. Locating the building's air intakes and exhausts, in relation to each other and sources of external pollution, in accordance with the following best practice as appropriate:
    a. PD CEN/TR 16798-4:2017 Sections 8.8.1 to 8.8.4
    b. BRE FB 30 Ventilation for healthy buildings: Reducing the impact of urban air pollution (2011)
    c. BRE IP 9/14 Locating ventilation inlets to reduce ingress of external pollutants into buildings, as appropriate
    d. CIBSE TM21
    e. ANSI/ASHRAE Standard 62.1:2025 Section 5.4 and Normative Appendix B
2. Pollutant dispersion modelling can be used to inform the location of the building's air intakes and exhausts in relation to each other and sources of external pollution. This can be achieved using either wind tunnel modelling or numerical modelling. Pollutant dispersion modelling in urban areas is complex, so it is important that the person carrying out the modelling is a competent individual (see Definitions).

Where significant levels of gaseous pollutants such as nitrogen dioxide are identified in the outdoor air, as in an Air Quality Management Area (AQMA), the use of appropriate gas phase filtration in the building ventilation system should be considered. Design teams must ensure that filter performance is appropriate for the pollutant conditions experienced at the site.

Naturally ventilated buildings

The design of naturally ventilated buildings must minimise the build-up of air pollutants. Ventilation intakes and airflow pathways should be designed using the guidance available in the following best practice documents:

- BRE FB 30 Ventilation for healthy buildings: Reducing the impact of urban air pollution (2011)
- BRE IP 9/14 Locating ventilation inlets to reduce ingress of external pollutants into buildings (2014), and
- CIBSE TM21 Minimising pollutants at air intakes (1999), as appropriate.

M1.4: Sensors

Sensors are recommended to be NDIR (Non-Dispersive Infrared) type, calibrated, mounted, and installed in line with the manufacturer's recommendations and in line with national guidance. The number of sensors should be decided based on the coverage of each sensor, according to the manufacturer.

For CO_2 monitoring used to gain ventilation credit, the sensors must be wall mounted. The CO_2 sensors should be placed at head height and away from windows, doors or air supply openings or the sensors must be installed in accordance with Building Regulations ADF2 for UK specific buildings.

M2: Emissions from construction products

M2.1: Scope of assessment of emissions from construction products

Only products that are installed or applied in parts of the building where their emissions are likely to affect indoor air quality need to be assessed. For the purposes of this issue, this means any product installed or applied:

- Inside of the inner surface of the building's infiltration.
- Inside of the vapour or waterproof membrane, or
- Inside of the inner surface of the building envelope's interior facing thermal insulation layer, where present.

The scope of the VOC credit issues covers products such as:

- Where a paint or coating falls within a category in Annex II of the EU Directive 2004/42/CE or, a category in the relevant product emission table of the technical manual, then the paint or coating must be assessed. This is likely to include paints and coatings applied to walls, ceilings, floors, doors, etc.
- A finish applied to a product in the factory. Any finished product as a whole must meet the performance requirements / emission limits set in the manual. For instance, a wood panel has a finish applied in the factory. The whole panel, including all the elements that make up that panel, would need to comply with the requirements set for wood panel products in this issue.
- Internal finishes to installations manufactured off-site such as elevators. The specification of internal finishes (regardless of whether they are installed on site or in the factory) will impact on VOC emissions.

M2.1.1: Non-VOC emitting products

Inherently non-VOC emitting products do not need to be assessed and can be deemed fully compliant with the criteria. Examples of non-VOC emitting products include:

- Brick
- Natural stone
- Concrete
- Ceramic tile
- Glass
- Metal surfaces etc.

This is unless potentially VOC emitting products (either organic- or inorganic-based) are used as coatings, binders, or sealants in their production or finishes.

M2.2: Guidance Note 22

Guidance Note 22 (GN22) provides a list of approved alternative schemes recognised by BREEAM and that can be used to demonstrate compliance for the VOC emission levels. If assessors, clients or scheme operators wish to seek recognition of

other schemes not currently listed, please contact the BREEAM office (breeam@bregroup.com) for details of the application process.

M2.3: Additional requirements for interior paints and coatings

Evidence must be provided to show that paints used in wet areas protect against mould growth. Evidence could include appropriate test results (e.g. fungal or algal resistance testing) or manufacturer's product information or declaration. There are European standard tests which could be used: EN 15457 and EN 15458.[40], [41]

In addition to the emission criteria by product type in Table 23 on page 125 and Table 24 on page 126, interior paints and coatings must also comply with requirements shown in Table 25 below.

Table 25: Maximum VOC content for paints and coatings

Product category	Free VOC content of ready-to-use product (g/l)	Testing requirements
Interior matt walls and ceilings (Gloss <25@60°)	10	ISO 11890-2 or ISO 17895 or Calculation based on the ingredients and raw materials
Interior glossy walls and ceilings (Gloss >25@60°)	30	
Interior trim and cladding paints for wood and metal	60	
Interior trim varnishes and wood stains, including opaque wood stains	60	
Interior minimal build wood stains	40	
Primers	10	
Binding primers	10	
One-pack performance coatings	65	
Multi-pack reactive performance coating products	65	
Anti-corrosion coating products and primers	65	

M2.4: Self-declaration of emission levels from construction products

Manufacturers' self-declaration of emission levels from construction products is acceptable in the form of technical specification sheets or manufacturers' literature provided the testing has been performed by an accredited laboratory in accordance with the above. OR, where the manufacturer declares that the product contains no formaldehyde or VOCs.

For paints and varnishes, manufacturers' calculations of VOC content, based on the constituent ingredients, can be used to demonstrate compliance with the testing requirement.

M2.5: Testing requirements for emission limits

The testing requirements for emission limits are based on the use of standardised emission test chamber methods. Perforator, flask, desiccator and other extraction-based test methods are specifically excluded. Compliance with these requirements may be met using alternative standards, where these stipulate emission test chamber methods similar to those in the standards listed in Table 23 and Table 24. BREEAM Assessors must submit details of any alternative standards to BRE Global for approval prior to awarding any credits for this issue.

M2.6: M&E construction products

For M&E purposes, only paints, coatings, adhesives and sealants that are applied on site during construction and finishing works need to be included in the assessment. Prefabricated M&E components that arrive on-site as complete, factory-finished products are excluded from emission assessment requirements. HVAC insulation can be excluded from the emission assessment.

M3: Post-construction indoor air quality measurement

The information in this methodology section is provided to assist project teams and BREEAM Assessors on the appropriate scope of post-construction indoor air quality measurement, and, as such, is intended as guidance only. The sampling strategy should be determined based on the advice of the IAQ professional appointed to conduct the testing.

M3.1: Competence and strategy

All sampling and measurement activities shall be carried out by a suitable IAQ professional who has experience working in the field of indoor air quality investigation and measurement. The organisation conducting the assessment must possess sufficient expertise to determine the appropriate number and location of sampling points.

The sampling strategy should be developed through discussion between the organisation conducting the assessment and a representative of the project team. This strategic advice must be based on the typology of the building spaces, their intended use, and the ventilation strategy (e.g., natural, mechanical, hybrid) employed in the building.

A detailed description of the sampling strategy, including the rationale for the selected locations and number of samples, must be included in the final report.

M3.2: Pre-sampling building conditions

The building should be fully completed before testing, with all finishes and furniture in place if it is a finished building. Ideally, sampling should be conducted prior to occupancy. If this is not possible due to time constraints, all measurements must be completed within the first two weeks of occupancy. In such cases, sampling can be conducted during weekends or other periods of low occupancy, provided the building's HVAC system is operating under normal conditions and the spaces have been configured for typical use (e.g., furniture in place, doors closed as normal) for at least the 24-hour pre-sampling closure period.

For naturally ventilated rooms, windows and external doors are opened for about 15 minutes and then kept closed or in normal operating conditions for at least 8 hours before sampling.

For mechanically ventilated rooms, the HVAC should be running under normal operating conditions for at least 3 hours before and during testing. Internal layouts and doors are kept as in normal use, and no activities such as painting, sealing, or use of strong cleaning products should occur in the two days prior to sampling.

M3.3: Sampling location strategy

Sampling is carried out in representative occupied spaces where people spend more than 30 minutes at a time, such as offices, classrooms, conference rooms, or bedrooms.

The number of sampling locations should be determined based on the homogeneity of the spaces. For example, in an office building, sampling a single cellular office is typically sufficient to represent all cellular offices of the same construction, fit-out materials, and ventilation strategy.

Conversely, in larger or open-plan areas, multiple sampling locations are required to assess the homogeneity of the environment. A limited number of areas per typology are sufficient where interior finishes and ventilation are consistent, while larger or open-plan areas require more locations.

Samples are collected from the breathing zone (about 1–1.5 m above the floor and away from walls, windows, or supply air diffusers).

M3.4: Sampling duration

The sampling duration at each location shall be set by the IAQ professional in charge to achieve the required sampling volumes as prescribed by the standard methods (e.g., ISO 16000-6, ISO 16000-3); typical sampling times are often in the range of 30-60 minutes. This ensures the collected sample is sufficient for laboratory analysis and provides results above the method detection limits.

M4: Emissions from furniture products

M4.1: Scope for assessment of emissions from furniture products

This requirement applies to all newly installed, commercial furniture products provided as part of the project. This includes, but is not limited to, seating such as task chairs, side chairs, guest chairs, and stools; desks and tables such as height-adjustable desks, conference tables, and training tables; workstations and hang-on components; and storage units such as freestanding cabinets, bookcases, and mobile pedestals.

The following product types are excluded from the assessment scope:

- Residential-grade furniture, i.e., mattresses, curtains, photo frames, etc, and medical furniture products.
- Bespoke, built-in, or fixed furniture.
- Furniture that was manufactured and installed more than 12 months prior to the assessment.
- Furniture designed for outdoor use only.
- Furniture which are part of the building structure.

— Furniture made entirely of inherently non-VOC-emitting products (as described in M2.1.1).

— Furniture made entirely of reused materials.

M4.2: Methodology for furniture emissions testing

Verification of compliance must be based on laboratory testing conducted by an ISO/IEC 17025 accredited laboratory in accordance with ANSI/BIFMA M7.1(42) (or its most recent iteration) or the California Department of Public Health (CDPH) Standard Method v1.2-2017.

The appropriate standard emission scenario, as specified in the respective method (e.g., office or classroom scenario in CDPH, and the defined environment in BIFMA/ANSI), must be used for testing.

M4.3: Furniture emissions certification requirements

The product certificate or test report must explicitly state compliance with the VOC emission limits specified in Section 7.6.1 or 7.6.2 of the ANSI/BIFMA e3 Furniture Sustainability Standard OR with the VOC emission limits defined in Table 4-1 of the California Department of Public Health (CDPH) Standard Method v1.2-2017.

Compliance notes

Ref	Terms	Description
Ventilation		
CN1	Ventilation with window opening restrictors	Opening restrictors to windows may sometimes need to be installed to meet: — Health and safety requirements — Building regulations — Legal obligations Where such external requirements are in force, these requirements cannot be used as a mitigating factor for meeting the BREEAM ventilation criteria. Even with window restrictors, adequate ventilation must still be demonstrated in accordance with the requirements.
CN1.1	Ventilation filter classification	Filters of class F7 and ePM_1 50% can be considered equivalent to those of class MERV 13.
CN1.2	Ventilation – filtration – single occupancy dwellings	For compliance with criterion 5, it is sufficient to demonstrate that a suitable filtration system is incorporated in the installed HVAC system, in accordance with the manufacturers' recommendations.
Emissions from construction and furniture products		
CN2	Products used in small quantities for ad hoc purposes	All products specified for a project that fall within one of the product types listed in Table 23 and Table 24 on page 126 must be assessed under this issue. However, it is accepted that it may be difficult to control the specification of some products (e.g. sealants) that are used in small quantities for ad hoc purposes such as 'making good'. As such, any products used in this way do not need to be assessed for this issue. The BREEAM Assessor should use their judgment to determine whether products being used or intended to be used for ad hoc purposes will be used in significant quantities and therefore need to be assessed for this issue.
CN2.1	Specialist products	Products specified for specialist applications or providing a specific function may be exempted from meeting the emission limits in Table 23 on page 125 and Table 24 on page 126 where it can be demonstrated that there are no alternative products available that can perform the function and meet the emission limits.
CN2.2	Formaldehyde E1 class	The formaldehyde E1 class is set by the European union commission in Regulation (EC) No 1907/2006. The minimum emission limit set for furniture and wood-based articles is ≤ 0.124 mg/m³. This is the current requirement. Note that new Regulation 2023/1464, published on 14 July 2023 comes into effect after 6 August 2026. The minimum emission limit set for furniture and wood-based articles is ≤ 0.062 mg/m³. All relevant products after the adoption date must comply with the new limit.
CN2.3	Number of products to comply when less	For compliance with the first credit for emissions from constructions products, where four product types are specified within the building, the requirements remain the same

Ref	Terms	Description
	than five product types are specified in the building – Non exemplary credits	and three out of the four must comply with the criteria for emissions from construction products. Where three or fewer product types are specified within the building, the number of product types that need to be assessed for the emissions criteria reduces proportionally as follows: — Where three product types are present, two must comply. — Where two or fewer product types are present, one must comply. For the second credit, all the products that are specified need to comply. For example, if only four product types were specified then all of these would need to comply to achieve the second credit.
CN2.4	Number of products to comply when less than five product types are specified in the building – Exemplary credits	For compliance with the first exemplary credit for emissions from constructions products, where four product types are specified within the building, the requirements remain the same and three out of the four must comply with the criteria for emissions from construction products. Where three or fewer product types are specified within the building, the number of product types that need to be assessed for the emissions criteria reduces proportionally as follows: — Where three product types are present, all must comply. Two exemplary credits are awarded if three out of three meet the requirement. — No exemplary credits are awarded if two out of three product types meet the requirement.
CN2.5	Testing to ISO 16000-10	Results of testing to ISO 16000-10 can be considered compliant with the relevant testing requirements of the emissions from construction products credit where the product manufacturer can demonstrate the results generated by testing to ISO 16000-10 correlate to results that would be achieved using EN 16516 or ISO 16000-9.
CN2.6	Ceiling materials, wall materials, acoustic insulation and thermal insulation materials	This product category refers to all building materials specifically designed for use in ceilings, walls, or as insulation systems, which are not covered under other categories in Table 23. This includes, but is not limited to, materials such as acoustic ceiling tiles, gypsum boards, wall insulation panels, mineral wool, rigid foam insulation, cement-bonded particle boards, acoustic boards, and wall coverings of any type.
CN2.7	Paints and varnishes in historic buildings	An exemption is provided for historic buildings where there is an explicit requirement from the Local Authority conservation officer or the national conservation body to use specific paints and varnishes that may contain a high level of VOCs. In all cases procedures should be in place to ensure the building is flushed out for a sufficient period prior to occupation and ventilated adequately in order to reduce risks with VOCs in accordance with criteria 2 and 3.
CN2.8	Bespoke, built-in, or fixed furniture	Furniture excludes bespoke, built-in, or fixed furniture. Fixtures and fittings that are integral to the building — such as kitchen units and toilet cubicles — would be assessed under the VOC emission criteria for construction product types.
CN2.9	Validity of product emission certificates or test reports	The product emission certificates, or test reports, must be valid either at the time of specification or at the time of purchase.
CN2.10	Untreated solid wood – Formaldehyde E1 emissions requirements	Testing for formaldehyde is not required for untreated solid wood where no formaldehyde containing binders, resins, adhesives, coatings, or chemical treatments have been used in the processing or manufacture. In such cases, a formaldehyde emissions test report is not required. However, the assessor must obtain confirmation from the manufacturer/supplier that: — the product is solid, untreated timber — no formaldehyde has been used as described above
CN2.11	Reused and reclaimed products	Criteria 8–9 and 16–18 are intended to apply to newly manufactured construction products and materials. Where a construction product can be robustly identified as previously used and is re used or reclaimed, it may be considered as outside the

Ref	Terms	Description
		scope of the emissions from construction products criteria. However, any new coatings, finishes, adhesives, sealants, or other chemical treatments applied for the product's installation must be considered and assessed separately, where relevant.
Emissions from construction and furniture products / post-construction indoor air quality measurement		
CN3	Accreditation of organisations performing analysis	All organisations conducting indoor air analysis or emissions testing of building products must be accredited to ISO/IEC 17025(43), with specific accreditation covering all applicable chemical analysis and emission testing methods relevant to their scope. The accreditation must be carried out by either: — A national accreditation body, e.g. UKAS. — An accreditation body that is a signatory to the ILAC Mutual Recognition Arrangement (ILAC MRA).
CN3.1	Accreditation of organisations performing laboratory analysis and testing of emissions	If sampling and analysis is carried out by two separate organisations, then the sampling organisation does not need to be accredited to the above (CN3). However, they must provide a brief report justifying: — The sampling methodology used. — Appropriate environmental conditions during the sampling. — The number and location of samples taken. This report is provided to the BREEAM assessor and submitted as supporting evidence for this issue.
CN3.2	Accreditation of product Certification bodies for Furniture emissions	The independent third-party certification body must meet the following accreditation requirements: — Be accredited to ISO/IEC 17065 for product certification. — Receive its accreditation from a national accreditation body (e.g. UKAS) or an accreditation body that is a signatory to the International Accreditation Forum (IAF) Multilateral Recognition Arrangement (MLA).

Evidence

Criteria	Interim design stage	Final post-construction stage
Prerequisite – No asbestos		
1	The relevant section or clauses of the building specification or contract or appropriate legislation.	A formal letter from the design team or principal contractor confirming no materials containing asbestos were used within the building in line with the relevant sections of the building specification, contract clauses or appropriate legislation.
Indoor air quality plan		
2	A copy of the indoor air quality plan.	Written confirmation including examples and any documentary supporting evidence to demonstrate how the indoor air quality plan was used to influence the design, specification and installation (measures relating to credits not targeted do not need to be implemented).
Ventilation		
3–7	Design drawings, relevant sections of the building specification or contract clauses.	Final construction drawings or equivalent and assessor site inspection report and photographic evidence. Confirmation sensors are calibrated and mounted in line with guidance. For a naturally ventilated building, a letter from the building services engineer confirming the

Criteria	Interim design stage	Final post-construction stage
		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.
Emissions from construction and furniture products and exemplary level		
8–9, 16–18	Relevant sections of the building specification, contract clauses, schedule or letter of commitment confirming specification of compliant materials. Where product specification is known, letters from or copies of the manufacturer's literature confirming testing standards and emissions achieved.	Confirmation from the project team of the materials installed for each relevant product type. Letter from or copies of the manufacturer's literature confirming testing standards and emissions achieved. Where applicable for paints and varnishes, evidence of protection against mould growth.
Post-construction indoor air quality measurement		
10–15	Commitment to carry out necessary testing post-construction.	Indoor air quality assessment report showing results of indoor air quality testing for formaldehyde and TVOCs, by a suitable IAQ professional. Where representative sampling is undertaken, the report must include details of the sampling strategy employed on site, including the rationale for selected locations, number of samples, and photographic evidence of sampling height. Where relevant, written confirmation from the project team of the remedial measures that have been undertaken.

Definitions

Category 1A and 1B carcinogens

Carcinogenic compounds detectable by the VOC emission testing requirements in Table 23 and Table 24 and that are classified as category 1A or 1B carcinogens in Annex VI to Regulation (EC) No. 1272/2008 on classification, labelling and packaging of substances and mixtures, which are listed as *Carcinogenic VOCs* in Annex H of EN 16516.[44], [45]

Competent individual – Wind tunnel modelling

An individual with one or more of the following qualifications and experience can be a 'competent individual' for the purpose of carrying out wind tunnel modelling:

1. Holds a degree or equivalent qualification in a relevant engineering field (mechanical, chemical), physics, mathematics, or meteorology, AND holds a membership to an appropriate professional body.
2. Has a minimum of three years relevant experience. Such experience must clearly demonstrate a practical understanding and experience of wind tunnel modelling and factors affecting outdoor pollutant dispersion in relation to ventilation and the built environment.

Competent individual – Numerical modelling

An individual with one or more of the following qualifications and experience can be a 'competent individual' for the purpose of carrying out numerical modelling:

1. Holds a degree or equivalent qualification in a relevant engineering field (mechanical, chemical), physics, mathematics, meteorology, environmental sciences, environmental engineering or a related environmental discipline, AND holds a membership to an appropriate professional body,
2. Demonstrated ability to interpret environmental guidelines, policies, plans and legislative requirements.

Fresh air

Fresh air is air used to supply air for buildings that ensures proper indoor air quality is achieved. This includes filtered outdoor air or air from a fresh supply.

Habitable or occupied room

A room used for dwelling purposes or a room in a non-dwelling occupied by people (e.g. office, hotel bedroom, classroom) but which is not used solely as a kitchen, bathroom, cellar, utility room or for storing plant or equipment.(46)

Occupied space – Ventilation

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 includes areas with a large and unpredictable or variable occupancy pattern, for example:

— Auditoria
— Gyms
— Retail stores, malls, or shopping centres
— Cinemas
— Waiting rooms

For the ventilation credit, the definition excludes:

1. Small spaces up to 125 m^3 volume, or up to 50 m^2 floor area.

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 for ventilation purposes (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).

Purge ventilation

Manually controlled ventilation of rooms or spaces at a relatively high rate to rapidly dilute pollutants and/or disperse water vapour. Purge ventilation may be provided by natural means (e.g. an openable window) or mechanical means (e.g. a fan).

R-value

Sum of all Ri values. Ri is the ratio Ci or LCIi, where Ci is the mass concentration of the individual VOC i. in the air of the reference room, and LCIi is the LCI value of VOC i. The LCI value is the 'Lowest Concentration of Interest', which is the substance-specific value for health-related evaluation of the emission from construction products as agreed by the EU-LCI Working Group (ec.europa.eu/growth/sectors/construction/eu-lci_en).

Smoking

Smoking includes tobacco as well as the use of e-cigarettes and vaporizers. A compliant smoking ban must include all listed forms of smoking.

Sources of external pollution

This includes, but is not limited to the following:

1. Highways and the main access roads on the assessed site.
2. Car parks, delivery areas and vehicle waiting bays.

3. Other building exhausts, including from building services plant, industrial or agricultural processes.

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 or drop-off or waiting bays.

Suitable IAQ professional

An individual who has at least 3 years of experience working in the area of IAQ monitoring.

Total semi-volatile organic compound (TSVOC)

Sum of the concentrations of identified and unidentified volatile organic compounds eluting between n-hexadecane (excluded) and n-docosane (included) on a gas chromatographic column.

Total volatile organic compound (TVOC)

Sum of the concentrations of identified and unidentified volatile organic compounds eluting between and including n-hexane and n-hexadecane on a gas chromatographic column.

Additional information

None.

Hea 05 Thermal comfort

(all buildings)

Aim

To ensure the building can provide an appropriate level of thermal comfort.

Overview

Assessment type	Credits available	Minimum standards	Applicable assessment criteria
Part 1: Fabric and structure	up to 2	None	1, 3–7, 8–11 (see ref 1.0)
Part 2: Core services	up to 3	None	1, 3–7, 8–14 (see ref 1.0 and 1.1)
Part 3: Local services	up to 2	None	1, 3–7, 12–14
Part 4: Interior design	up to 1	None	2

Assessment type specific notes

Ref	Assessment type specific note
1.0	**Part 1 and Part 2 – Thermal modelling** Where assumptions are required for the purpose of the thermal model (criteria 1 to 11), these must be reasonable and represent typical use patterns and loads given the parameters and function of the building. Note that thermal modelling may need to be completed based on a typical notional layout.
1.1	**Part 2 – Thermal zoning and controls** When some of criteria 12–14 are out of scope of the core services and associated infrastructure of a Part 2 assessment. The criteria must be addressed as far as possible. Where demonstration of compliance is not possible, justification must be provided by the design team.

Building type specific notes

Ref	Building type specific note
2.0	**Industrial (without offices)** Where an industrial unit contains no office space and only an operational or storage area, this BREEAM issue does not apply.
2.1	**Industrial (with offices)** The thermal comfort criteria (criteria 1 to 11) do not apply to the operational or storage areas typically found in industrial assets or other similar asset types. The criteria still apply to the other parts of the asset as appropriate.
2.2	**Education** In this issue, occupant controls (criterion 14) are for staff use only.
2.3	**Buildings with less complex heating or cooling systems** Thermal modelling – An alternative, less complex analysis may be appropriate, compared to full dynamic building simulation (criterion 1). Thermal zoning and controls – The strategy need only comply with criteria 14.a and 14.b, see M2.2.
2.4	**Healthcare, Education and other** Alternative standards for Thermal modelling –current climate are outlined in M1.2.1 and M1.2.2 for UK Healthcare and Education buildings. Other alternative standards are allowed in line with CN1.5.

Assessment criteria

One credit – Thermal modelling – Current climate

1 Calculate thermal comfort in relevant occupied areas using full dynamic building simulation (see M1.2). Do this in accordance with an approved standard below taking full account of seasonal variations.

2 Where undertaking a Part 4 assessment, a competent person (e.g. accredited building services engineer) must assess the suitability of existing building services and controls to identify any changes that may be required as a result of fit-out works (e.g. as a result of changes to internal layout, occupant density, additional equipment that may increase cooling loads etc.).

3 For UK assets, the 2025 CIBSE weather data[47] must be used in line with M1.2.3

For air-conditioned buildings

4 The building is designed to meet thermal comfort criteria, using one of the following methodologies:

- 4.a Thermal comfort levels in occupied spaces meet the Category II requirements set out in Table A.1 of Annex A of ISO 7730:2025.[48]
- 4.b ANSI/ASHRAE Standard 55:2023.
- 4.c CIBSE Guide A Environmental design[49], Table 1.5
- 4.d EN 16798-1:2019
- 4.e Other appropriate industry standard (where this sets a higher or more appropriate requirement or level for the building type), see CN1.5.

5 When generated, report the PMV and PPD indices based on the above modelling via the BREEAM Platform (see CN1.3 and CN1.4).

For naturally ventilated buildings and mechanically ventilated buildings with limited comfort cooling

6 Winter operative temperature ranges in occupied spaces are in accordance with the criteria set out in CIBSE Guide A Environmental design, OR other appropriate industry standard (where this sets a higher or more appropriate requirement or level for the building type).

7 The building is designed to limit the risk of overheating, using the adaptive comfort methodology in one of the following standards:

- 7.a ANSI/ASHRAE Standard 55:2023
- 7.b CIBSE TM59: Design methodology for the assessment of overheating risk in homes
- 7.c CIBSE TM52: The limits of thermal comfort: avoiding overheating in European buildings
- 7.d CIBSE Guide A
- 7.e EN 16798-1:2019
- 7.f Other appropriate national or local industry standard to achieve the same outcome (where this sets a higher or more appropriate requirement or level for the building type), see CN1.5.

One credit – Thermal modelling – Future climate

8 Criteria 1 and 3 to 7 are achieved.

9 The thermal modelling shows that the relevant requirements set out in criterion 3 or 7 are achieved for a projected climate change environment (see M1.3).

10 Where criterion 9 above is not met, the project team shows how the building has been adapted, or designed to be easily adapted in future using passive design solutions to meet the requirements under criterion 9.

11 For air-conditioned buildings, when generated, report the PMV and PPD indices based on the above modelling via the BREEAM Platform (see CN1.3 and CN1.4).

One credit – Thermal zoning and controls

12 Criteria 1 and 3 to 7 are achieved.

13 The thermal modelling analysis (criteria 1 and 3 to 7) has informed the temperature control strategy for the building and its users.

14 The strategy for proposed heating or cooling shows that it has addressed:

14.a Thermal zoning in the building and how building services will efficiently and appropriately heat or cool these areas.

14.b The degree of user control required for these zones, appropriate for the end users, see M2.1. The strategy considers:

14.b.i User knowledge of building services.

14.b.ii The level of control required based on occupancy type, patterns, and room functions (see M2.2).

14.b.iii How the user is likely to operate or interact with the heating or cooling systems.

14.b.iv User expectations across seasons and degree of individual control.

14.c Where there is more than one system, how the proposed systems will interact and interlock with each other and how this may affect the thermal comfort of the building occupants.

14.d The need or otherwise, for an accessible user-activated manual override for any automatic systems.

Methodology

M1: Thermal comfort strategies

M1.1: Thermal comfort strategy – occupancy patterns

Where it is not possible to confirm the number of end users using the building, then the default occupancy rates given in Tra 02 Sustainable transport measures – Table 72: on page 270 can be used to determine the default number of users. Where the typical use patterns are also unknown, Tra 01 Transport assessment and travel plan – Table 63: on page 249 can be used to determine the typical opening hours of different building types. The design team need to justify or validate the occupancy number and use patterns applied in the thermal model.

M1.2: Thermal modelling – current climate

The software used to carry out the thermal modelling simulation at the detailed design stage needs to provide full dynamic analysis. Further guidance on thermal modelling can be found in CIBSE AM11 Building performance modelling.(50)

Where the weather file for the nearest location isn't representative of actual climatic conditions on site, it is acceptable to use a more representative weather file from another, nearby location, which more closely matches the climate at the actual location. Doing this can take into account additional factors such as altitude, prevailing wind direction, urban heat island effect and also proximity to climate moderating features such as the sea, mountains, woodland, and lakes.

M1.2.1: Healthcare building types (for UK only)

The appropriate industry standard for healthcare ventilation is Health Technical Memorandum 03-01: Specialised ventilation for healthcare premises (2021 version)(51) Thermal comfort levels in patient and clinical areas must align with the temperature and humidity parameters specified in HTM 03-01 (2021), which establishes performance-based requirements tailored to clinical functionality and infection control needs. Ventilation systems must be designed to prevent overheating, ensuring conditions remain appropriate for the clinical purpose of each space. For other occupied spaces not directly addressed by HTM 03-01, design should follow CIBSE Guide A Environmental Design, ensuring compatibility with healthcare requirements where spaces interconnect or are adjacent to clinical areas.

M1.2.2: Education building types (for UK schools only)

As an alternative to CIBSE TM52, an appropriate industry standard for schools include Building Bulletin 101, Ventilation of school buildings (April 2018)(52) or the Department for Education School Output Specification – Technical Annex 2F(53) as appropriate.

M1.2.3: Current climate weather file (for UK only)

Dynamic thermal simulation software packages provide the facility for building designs to be assessed under external climatic conditions specific to geographic location. Industry standard weather data for the UK is available in the form of Design Summer Years (DSYs) provided by CIBSE (2025) (www.cibse.org/weatherdata). Further details are included in Additional information.

For current climate conditions, buildings in the UK must be tested against DSY1, 2030s (2019–2039), High Emissions, 50th percentile weather file when a specific weather file is not mandated in the selected methodology.

M1.3: Thermal modelling – future climate

M1.3.1: Future climate files – All locations except UK

Dynamic building simulation software must be used to assess the design of buildings in different climatic conditions that are specific to the current geographical location.

Climate data can be freely accessed for various locations from EnergyPlus and Climate.OneBuilding or an alternative source outlined in the Additional information. The climate data should refer to the area as close and most representative to the location as possible.

The future climate file is created based on climate models according to IPCC Assessment Report 5 or 6. Either the RCP or the SSP scenarios can be used for this analysis as defined below.

For the RCP scenario Weathershift can be used to prepare the climate data to account for future climate change.

Naturally ventilated buildings

- Time period: 50 years after construction is complete.
- Emissions scenario: RCP 4.5 or SSP2-4.5.
- Percentile: 50%.

Mechanically ventilated buildings or mixed mode buildings

- Time period: 15 years after construction is complete.
- Emissions scenario: RCP 8.5 or SSP5-8.5.
- Percentile: 50%.

The future weather files represent the minimum requirements to perform thermal modelling under a climate change scenario and to demonstrate compliance. Where design teams feel that added consideration of building occupant risk or sensitivity to overheating is necessary, weather files can be used that exceed the minimum requirements outlined above.

The time periods represent the probable building services life cycle for each thermal comfort strategy. A shorter period is used for mechanically ventilated or mixed-mode building types due to typical equipment life span before major upgrade or replacement. This avoids over-specification of plant which could lead to inefficient operation.

M1.3.2: Future climate files – UK only

For overheating assessments, building designs can be evaluated under externally applied climatic conditions that are specific to a given UK geographic location using industry-standard future weather data. CIBSE provides future climate weather files derived from UK climate projections, including Design Summer Year (DSY) files that represent anticipated hot summer conditions for defined future time horizons. Further details on the available weather files are included in 'Weather data technical briefing V1.0' (CIBSE, 2025)[54] (https://go.cibse.org/weather-data-technical-briefing) and the additional information section.

To assess the projected climate change environment, UK assets must be assessed against a minimum of two scenarios selected using a risk-based approach as set out below.

Key considerations for the selection of weather file scenarios include:

- **Building lifespan:** Buildings with a longer lifespan (non air-conditioned buildings) should be tested against later time periods (e.g., 2050's or 2080's).
- **Building services:** Mechanically or mixed-mode building types should be tested at a shorter period due to the typical equipment life span before major upgrade or replacement.

— **Occupant vulnerability:** Spaces serving sensitive occupants (e.g., healthcare, elderly care) should be tested under more extreme conditions, such as DSY2 and DSY3 or higher percentiles or emission scenarios.

— **Area type sensitivity:** Areas with high solar exposure (e.g., glazed façades, atriums), high internal gains (e.g., kitchens, server rooms), or critical functions (e.g., healthcare) should be tested under more extreme conditions such as DSY2 and DSY3 or higher percentiles or emission scenarios.

The risk-based approach ensures that design decisions are proportionate and targeted for the asset's specific requirements. Evidence must be provided that justifies the selection of each scenario, for example by taking into account the key considerations listed above. The list of key considerations is guidance only and other factors can be used to select appropriate weather files. The objective of this assessment is to minimise the risk of overheating in the future and to ensure that passive design measures are considered in line with criterion 9 where required.

M1.4: Mixed mode buildings

Where a building has some occupied spaces that are naturally ventilated and some occupied spaces that are air-conditioned, the thermal modelling must show that the naturally ventilated spaces meet the criteria for naturally ventilated buildings (criterion 6) and that the air-conditioned spaces meet the criteria for air-conditioned buildings (criterion 4).

M2: Thermal zoning and controls

M2.1: End user controls

Where the end users are known, the thermal controls are based on discussions with the end user.

Where the end users are unknown, the thermal controls are based on building or use-specific design guidance, case studies, and feedback.

M2.2: Spaces requiring user controls

The types of spaces for which user controls are required or would be considered beneficial are listed below.

User controls required

Spaces where users are expected to have independent control over their environment.

— Owned spaces: small rooms for a few people.
For instance, cellular offices, owned spaces in residential assets.

— Temporarily owned spaces: where occupants expect to operate the environmental controls while they are there.
For instance, meeting rooms and hotel bedrooms.

— Shared spaces.
For instance, multi-occupied areas such as open-plan offices or workshops.

User controls not required

Spaces where users are not expected to have independent control over their environment.

— Managed spaces: where environmental control is expected to be centrally managed.
For instance, atria, circulation areas, concourses, entrance halls, function halls, restaurants, libraries, and shops.

— Occasionally visited spaces.
For instance, storerooms, bookstacks in libraries, aisles of warehouses, toilets.

M2.3: Thermal comfort strategy for less complex heating or cooling systems

For buildings with less complex heating or cooling systems the thermal comfort strategy need only comply with criteria 14.a and 14.b.

Where zoning allows separate occupant control, compliance is shown where (within the occupied space) each perimeter area and the central zone are separately zoned. The depth of perimeter area must be within 7m of each external wall, and the central zone would in this instance be over 7m from the external walls.

For example, adequate TRVs placed in zones around the building perimeter, and the provision of local occupant controls to internal areas, such as fan coil units.

Note: The distance requirement for smaller buildings is approximate; however, the assessor must use sound judgment considering fully the aims of this issue, before accepting solutions that do not strictly meet the above criteria.

Examples of potentially compliant heating control measures can be found in Technology Guide CTG065 Heating control.(55)

Compliance notes

Ref	Terms	Description
Thermal modelling – current and future climates		
CN1	Alternative to criterion 4.a	In some cases it may be more straightforward to show compliance with the Category II design criteria in Table A.5, Annex A of ISO 7730:2025. BREEAM considers this an appropriate equivalent to Table A.1; however, the example design criteria included in Table A.5 must be applicable to the building or space type and activity levels for the project.
CN1.1	Approach to thermal model when using BMS	Where there are smart systems such as BMS in place, modelling must consider normal operating conditions, with the heating and cooling system in operation regardless of the control strategy. To correctly size the heating/cooling plant, the design team must carry out modelling to calculate the heat gains and losses throughout the year. Results of these calculations must be submitted, with the heating/cooling plant specification which would demonstrate that the building has been designed to ensure internal winter/summer temperatures will not drop below an acceptable level.
CN1.2	Air-conditioned spaces – future climate	Air-conditioned spaces are assessed to ensure appropriate thermal comfort levels are achieved. Cooling capacity should be sufficient to comply with the requirements of ISO 7730:2025 or CIBSE Guide A, however providing sufficient space to install additional capacity to meet the requirements later in line with projected future climate scenarios is also acceptable.
CN1.3	Acceptable thermal environment – Air-conditioned buildings	Category II requirements set out in Table A.1 of Annex A of ISO 7730:2025 are: PPD < 10% and PMV range of (-0.5 < PMV < +0.5). This also aligns with category II requirements in CIBSE Guide A and ASHRAE 55.
CN1.4	Reporting PPD and PMV figures	The PMV (Predicted Mean Vote) and PPD (Predicted Percentage Dissatisfied) values need to be entered into the BREEAM Platform. The thermal modelling specialist should be able to provide values for both the PMV and PPD for the asset. The values to report are the observed range of values for PMV and PPD: — Across all occupied areas and, — Across all expected occupied hours. If the software or calculation method used does not generate these PMV / PPD metrics, they do not have to be provided.
CN1.5	National or local alternative to ISO standard	It is possible to use a national or local equivalent standards, however this must be approved by BRE Global. The Approved Standards list can be used to check for previously approved standards or to propose a new national or local standard.
CN1.6	Naturally ventilated buildings with heating for winter months – current climate	Where naturally ventilated occupied spaces are heated in the winter/heating season, such spaces can demonstrate compliance with the criteria for air-conditioned buildings (criterion 4) as an alternative to demonstrating compliance with criterion 6. When these naturally ventilated occupied spaces are in 'free-running mode' (i.e. outside of the winter/heating season), the spaces must meet the requirements for naturally ventilated buildings (criterion 7).
CN1.7	Future climate – Alternative weather files	Different or newer weather files can be used instead of those referenced. Weather files based on climate projections with higher temperatures than those specified in the relevant criteria, set a more robust standard for overheating and so they are acceptable.

Ref	Terms	Description
		The alternative weather files need to include the same variables as the specified weather files (e.g. dry bulb and wet bulb temperature, wind speed and direction, solar altitude and azimuth, cloud cover etc.) for each hour of the year.
CN1.8	Future climate – Winter conditions	Where future climate change scenario projections in winter indicates a higher temperature and, therefore, more thermally comfortable climate compared to the current winter temperatures, it can be assumed that the winter conditions within the climate change scenario are met based on the thermal modelling of current winter conditions. Justification must be provided for each project confirming that the future winter conditions will be met with the current heating system.
CN1.9	Thermal comfort – Historic buildings	In historic buildings, the thermal comfort requirements must still be in accordance with criteria 1–6 to demonstrate compliance, except where alternative performance standards are required by a local or national conservation body or authority. Wherever appropriate, heating systems should be modelled for continuous heating rather than intermittent heating.
Thermal zoning and control		
CN2	Occupant control – BMS and degree of control	A building management system-controlled set point with local override controls limited to a set range would satisfy the occupant control requirement. The temperature range available to building users must be confirmed as appropriate for the building type and user profile.

Evidence

Criteria	Interim design stage	Final post-construction stage
Thermal modelling – current and future climates		
1–11	Compliant thermal modelling report, measurements and evaluation results with confirmation that these are within the required limits. Confirmation that the modelling software is BREEAM compliant. Where applicable, PMV/PPD data from the design team. For UK assets, provide justification for the selection of future climate weather files.	Thermal modelling, measurement and evaluation results reflecting any changes to the design and resultant PMV/PPD data (where relevant) with confirmation that these are within the required limits. OR Written confirmation from the building physics engineer that there have been no changes required to the thermal modelling provided at design stage. For UK assets, provide justification for the selection of future climate weather files.
10	Where the requirements are not met for the projected climate change environment provide evidence such as drawings or specifications to demonstrate how the building has been adapted or designed to be easily adapted using passive design solutions in order to comply.	Final construction drawings or equivalent, relevant sections of the building specification or assessor site inspection report and photographic evidence to confirm that any required design adaptations or passive measures have been implemented.
Thermal zoning and control		
12–14	Thermal comfort strategy highlighting the points that have been considered and decisions taken accordingly. Design drawings and relevant sections of the building specification which show the proposed HVAC systems, zoning and controls that have been specified.	Final construction drawings or equivalent to confirm the thermal comfort strategy has been implemented and confirming zoning and controls provided. Assessor site inspection report and photographic evidence to verify specified systems and controls are installed.

Definitions

Heating and cooling systems

Heating and cooling system examples include openable windows, thermostatic radiator valves (TRVs), room thermostats, ceiling fans and fan coil units with user control.

Mechanically ventilated buildings with limited comfort cooling

Mechanically ventilated buildings with limited comfort cooling is a broad term that has been used to outline a building service system that does not have full air conditioning and interlock between systems. In this situation using the adaptive comfort approach can be more appropriate to avoid over specifying plant size and specification. It is up to the assessor and design team members to choose the most appropriate thermal comfort strategy.

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. However, for the purpose of this issue, the definition excludes the following:

1. Atria or concourses.
2. Entrance halls or reception areas.
3. Ancillary space, e.g. circulation areas, storerooms and plant rooms.

Passive design

Passive design uses layout, fabric and form to reduce or remove mechanical cooling, heating, ventilation and lighting demand. Examples of passive design include optimising spatial planning and orientation to control solar gains and maximise daylighting, manipulating the building form and fabric to facilitate natural ventilation strategies and making effective use of thermal mass to help reduce peak internal temperatures.

Predicted mean vote (PMV)

The PMV is an index that predicts the mean votes of a large group of persons on the seven-point thermal sensation scale based on the heat balance of the human body. Thermal balance is obtained when the internal heat production in the body is equal to the loss of heat to the environment.

Predicted percentage dissatisfied (PPD)

The PPD is an index that establishes a quantitative prediction of the percentage of thermally dissatisfied people who feel too cool or too warm. For the purposes of ISO 7730, thermally dissatisfied people are those who will feel hot, warm, cool or cold.

Separate occupant control

Responsive heating or cooling controls for a particular area or zone of the building that can be accessed and operated by the individuals occupying that area or zone. Such controls will be located within, or within the vicinity of, the zone or area they control.

Thermal comfort

In EN ISO 7730:2025: Ergonomics of the thermal environment. Analytical determination and interpretation of thermal comfort, 'thermal comfort' is defined using the calculation of PMV and PPD indices and local thermal comfort criteria and is 'that condition of mind which expresses satisfaction with the thermal environment.' The term 'thermal comfort' describes a person's psychological state of mind and is usually referred to in terms of whether someone is feeling too hot or too cold. Thermal comfort is difficult to define because it needs to account for a range of environmental and personal factors to establish what makes people feel comfortable. The purpose of this issue is to encourage appropriate and robust consideration of thermal comfort issues and specification of appropriate occupant controls to ensure both maximum flexibility of the space and thermal comfort for most of building occupants.

Thermal dynamic analysis

Thermal comfort analysis tools can be subdivided into several 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 or cooling loads, overheating risks and control strategies to be assessed.

Additional information

Projected future climate weather data

The Intergovernmental Panel on Climate Change (IPCC) 6th Assessment Report outlines future climate change scenarios that can be used to project a range of alternative probabilistic weather data. These weather data should be used to evaluate the impact of varying climate change scenarios for the country to influence building design performance for the building throughout its life cycle.

Reference can be made to applicable international weather files in the following:

- www.ashrae.org/technical-resources/bookstore/ashrae-international-weather-files-for-energy-calculations-2-0-iwec2
- www.iesve.com/support/weatherfiles
- energyplus.net
- climate.onebuilding.org

Weathershift can be used to convert current weather files into future scenarios (see M1.3):

- weathershift.com/weathershift/heat

Appropriate industry standards

BREEAM has not attempted to list all appropriate industry standards. Any recognised collaborative industry or sector best practice standard or guidance that sets thermal performance levels, in terms of thermal comfort and design temperature, can be considered an appropriate industry standard for the purposes of this BREEAM issue, see CN1.5 and CN1.7. CIBSE Guide A (Table 1.5) includes recommended summer and winter comfort.

CIBSE Design Summer Years (UK)

DSYs are years with various hot weather events and should be used to conduct overheating risk assessments. There are three types of DSY files available (DSY1, 2 and 3) representing different hot weather events:

- DSY1: a moderate year containing heat events with a return period of 7 years.
- DSY2: the year containing the most intense heat events.
- DSY3: the year containing the longest heat events.

The 2025 CIBSE weather datasets cover three time periods with different emission scenarios:

- 2030s: High scenario (RCP 8.5).
- 2050s: Medium (RCP 4.5) and High (RCP 8.5).
- 2080s: Low (RCP 2.6), Medium (RCP 4.5), and High (RCP 8.5).

Additionally, probability percentiles are provided to represent variations in climate projections:

- 2030s: 50th percentile only.
- 2050s and 2080s: 10th, 50th, and 90th percentiles.

Hea 06a Acoustic performance

(all buildings, all countries except UK)

For buildings in the UK, see Hea 06b Acoustic performance on page 159.

Aim

To ensure the building provides an appropriate acoustic environment to enhance the comfort of building users.

Overview

Assessment type	Credits available	Minimum standards	Applicable assessment criteria
Part 1: Fabric and structure	up to 4	None	1, 2–4 or 1, 8–10 (see ref 1.0)
Part 2: Core services	up to 4	None	1, 2–4 or 1, 8–10 (see ref 1.0 and 1.1)
Part 3: Local services	up to 4	None	1, 2–6 or 1, 8–10 (see ref 1.1)
Part 4: Interior design	up to 4	None	1, 5–7 or 1, 8–10

Assessment type specific notes

Ref	Assessment type specific note
1.0	**Alternative means of demonstrating compliance** The basic built form has a large impact on the acoustic performance of the building, and in the case of a shell only or shell and core development, this aspect of the build would be outside the control of the tenant. A suitably qualified acoustician (SQA) must carry out a quantifiable assessment of the specification of the build form, construction and any external factors that are likely to affect the indoor ambient noise levels. The SQA must then confirm the developer's works will enable a future tenant utilising a typical fit-out and specification to meet the levels required to demonstrate compliance. Where the majority of a building's floor plan will require high performance acoustic environments (e.g. classroom/seminar buildings), then the BREEAM requirements must be achieved for the entire shell where specific layouts are not determined by the built form. One credit can be awarded where this has been achieved. Post-construction testing is not required subject to confirmation from the project team that the built form, construction and any external factors have not changed from those used in the SQA's assessment.
1.1	**Part 2 and/or Part 3 assessments** Where an SQA confirms that it is not possible to meet the indoor ambient noise and/or sound insulation criteria in accordance with the relevant tables in full due to the scope of works. Compliance can be demonstrated in accordance with M3.

Building type specific notes

Ref	Building type specific note
2.0	**Building types without areas 'used for speech'** Where a building type does not have areas 'used for speech', it does not need to comply with the relevant 'reverberation times' criteria. In these instances, the credit available for reverberation can be awarded by default where the building complies with the indoor ambient noise level and sound insulation criteria.

Assessment criteria

Prerequisite – Suitably qualified acoustician

1 A suitably qualified acoustician (SQA) is appointed by the client at the appropriate stage in the procurement process (but no later than completion of concept design) to provide early design advice on:

1.a External sources of noise impacting the chosen site.

1.b Site layout and zoning of the building for good acoustics.

1.c Acoustic requirements for users with special hearing and communication needs.

1.d Acoustic treatment of different zones and façades.

Acoustic performance standards

For all building types, except Residential institutions (long-term stay).

One credit – Indoor ambient noise

2 All unoccupied spaces comply with the indoor ambient noise level targets as detailed in the more rigorous of criteria 2.a or 2.b below:

2.a Indoor ambient noise level targets within national building regulations or other appropriate good practice standards.

2.b Where national building regulations or good practice standards do not exist for the building type or do not provide indoor ambient noise targets, the indoor ambient noise levels comply with 'good practice' criteria levels outlined in Table 26 on the next page.

3 An SQA carries out ambient noise measurements to ensure that the relevant spaces achieve the required levels. Where the measurements identify that spaces do not meet the standards, remedial works are carried out and the measurements repeated to confirm that the levels are achieved prior to handover and occupation.

Education buildings only:

4 Teaching and learning spaces with lightweight roofs and roof glazing demonstrate that the reverberant sound pressure levels in these rooms are not more than 25 dB above the appropriate limits given in Table 26 on the next page.

One credit – Sound insulation

5 The sound insulation between acoustically sensitive rooms and other occupied areas comply with the privacy requirements, as detailed in the more rigorous of criteria 5.a or 5.b below:

5.a Sound insulation between acoustically sensitive rooms and other occupied areas comply with targets within national regulations or other appropriate good practice standards.

OR

5.b Where relevant national regulations or good practice standards do not exist for the building type or do not provide sound insulation performance targets, the sound insulation between acoustically sensitive rooms and other occupied areas complies with the following Speech Privacy Potential: $D_w + L_{AeqT} > 75$.

5.c Where privacy is viewed to be critical by the client or design team (e.g. doctor's consulting room, consulting room within a bank) or where the room is adjacent to a noisy space such as a music room, the area shall comply with an enhanced Speech Privacy Potential: $D_w + L_{AeqT} > 85$.

6 The source and receive room sound pressure levels from which D_w is determined are measured in accordance with (EN) ISO 16283-1:2014+A1:2017 and rated in accordance with (EN) ISO 717-1:2020. Measurements by the SQA must be based on finished, but unfurnished rooms, accounting for, and to include the effect of, any carpets and acoustically absorbent ceilings specified.

One credit – Reverberation times

7 Rooms or areas used for speech (including meeting rooms and rooms for public speaking) or rooms used for music performance and rehearsal, achieve reverberation times as detailed in the more rigorous of criteria 7.a OR 7.b and 7.c as

measured by the SQA:

7.a Demonstrate that the reverberation time or equivalent absorption area for relevant spaces complies with targets within relevant national regulations or other appropriate good practice standards.

7.b Where relevant national regulations or good practice standards do not require the control of reverberation time, achieve reverberation times compliant with Table 27 on the next page.

7.c If relevant to the assessed building, all areas used for teaching, training and educational purposes achieve reverberation times compliant with Table 28 on the next page.

Acoustic performance standards – Residential institutions (long-term stay)

Up to four credits – Sound insulation

8 The building meets the acoustic performance standards and testing requirements as detailed in the more rigorous of EITHER:

8.a Airborne and impact sound insulation values comply with the performance improvement standards, as compared to the relevant national regulations outlined in Table 29 on the next page OR

8.b Airborne and impact sound insulation levels comply with the performance standards outlined in Table 30 on page 151 unless otherwise stated within these criteria.

9 A programme of pre-completion testing is carried out by the SQA EITHER:

9.a Based on the normal programme of testing described in the relevant national regulations for every group or sub-group of rooms for residential purposes; this must demonstrate that the performance standards detailed within this issue are achieved OR

9.b Where there are no relevant national regulations in place, or they require laboratory measurements to demonstrate compliance, the programme of on-site pre-completion testing must be carried out based on the 'Frequency of testing required' guidance (see calculation procedures in Methodology on page 151) for every group or sub-group of rooms.

10 The number of credits awarded will depend on improvement to the national regulations determined according to Table 29 on the next page or Table 30 on page 151. Where commercial space is below the residential space, only airborne sound insulation tests will be required.

Checklists and tables

Table 26: A selection of good practice indoor ambient noise level targets in unoccupied spaces

Function of area	Indoor ambient noise level*
General spaces (staffrooms, restrooms)	≤ 40 dB L_{AeqT}
Single occupancy offices	≤ 40 dB L_{AeqT}
Multiple occupancy offices	40–50 dB L_{AeqT}
Meeting rooms	35–40 dB L_{AeqT}
Receptions	40–50 dB L_{AeqT}
Spaces designed for speech, e.g. teaching, seminar or lecture rooms	≤ 35 dB L_{AeqT}
Concert hall, theatre or auditoria	≤ 30 dB L_{AeqT}
Informal café or canteen areas	≤ 50 dB L_{AeqT}
Catering kitchens	≤ 50 dB L_{AeqT}
Restaurant areas	40–55 dB L_{AeqT}
Bars	40–45 dB L_{AeqT}
Retail areas	50–55 dB L_{AeqT}
Manual workshops	≤ 55 dB L_{AeqT}
Sound recording studios	≤ 30 dB L_{AeqT}
Laboratories	≤ 40 dB L_{AeqT}

Function of area	Indoor ambient noise level*
Sports halls or swimming pools	≤ 55 dB L_{AeqT}
Library areas	40–50 dB L_{AeqT}
Hotel bedrooms	< 35 dB L_{AeqT}
* Where ranges of noise levels are specified and 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 level criteria to be lower than or equal to the upper limit of the range.(56)	

Table 27: Guide to reverberation time, T, at 500 Hz in unoccupied rooms for speech and music

Room volume m³	Reverberation time T* s	
	Speech	Music
50	0.4	1.0
100	0.5	1.1
200	0.6	1.2
500	0.7	1.3
1000	0.9	1.5
2000	1.0	1.6
* Where the reverberation times stated above or in the referenced documents are not appropriate for the type of space or building being assessed, the acoustician must confirm why this is the case. In addition, the acoustician must set alternative appropriate reverberation times at the design stage and provide these to demonstrate compliance.		

Table 28: Performance standards for reverberation in teaching and study spaces – mid-frequency reverberation time, Tmf, in finished but unoccupied and unfurnished rooms

Type of room (receiving room)	Tmf (seconds)*
Open plan	
Teaching areas	< 0.8
Resource areas	< 1.0
Lecture rooms	
Small (fewer than 50 people)	< 0.8
Large (more than 50 people)	< 1.0
Recording studio	0.6–1.2
Control room for recording	< 0.5
Libraries	< 1.0
Audio-visual, video conference rooms	< 0.8
* Tmf is the arithmetic average of the reverberation times in the 500 Hz, 1 kHz and 2 kHz octave bands.(57)	

Table 29: Airborne and impact sound insulation performance improvement standards for national legislation or standards

Credits	Airborne sound insulation dB	Impact sound insulation dB
	Separating walls and floors between units*	Separating floors between units*
1	Insulation values are at least 3 dB higher	Insulation values are at least 3 dB lower**
3	Insulation values are at least 5 dB higher	Insulation values are at least 5 dB lower**
4	Insulation values are at least 8 dB higher	Insulation values are at least 8 dB lower**
* Only habitable rooms with separating walls and floors need to be assessed, see M2. ** The index used to express impact sound insulation is usually based on the level of transmitted impact sound, such that a lower measured value indicates greater resistance to impact sound transmission. If the converse for the locally defined national index is true, the credit award will be based on the same performance increase as detailed for the airborne sound insulation and an accompanying statement from the SQA.		

Table 30: Performance standards for airborne and impact sound insulation levels

Credits	Airborne sound insulation for DnT,w + Ctr dB (minimum values)	Impact sound insulation for L'nT,w dB (maximum values)
	Separating walls and floors between units*	Separating floors between units*
1	48	59
3	50	57
4	53	54
* Only habitable rooms with separating walls and floors need to be assessed, see M2.		

Methodology

M1: Testing, measurement and calculation procedures – All building types except residential institutions (long term stay)

Where specific guidance on testing, measurement and calculation is not stated in the criteria tables above for the relevant building type, or within the relevant standard or guidance referenced, the following procedures can be followed by the SQA when measuring or calculating the levels required to demonstrate compliance with this BREEAM issue. Where it is necessary to deviate from the procedures, the SQA should provide a reason for doing so and confirm that the alternative procedures are adequate for demonstrating that the asset meets the acoustic performance requirements.

Where a programme of pre-completion testing identifies that spaces do not meet the standards, remedial works must be undertaken in accordance with M4.

Measurements of airborne and impact sound insulation should be made in accordance with the relevant part of the ISO 16283 series. Measurements should be conducted between one in four pairs of adjacent rooms of each room type or performance requirements category and construction type.

For measurements of reverberation time, the relevant principles of ISO 354:2003 should be used and the guidance provided in ISO 16283-1:2014 should be followed in respect of the number of source and microphone positions, and decay measurements.

For measurements of ambient noise, when no specific guidance is available, the following procedures should be used:

1. Noise from both internal sources (e.g. mechanical ventilation systems, plant noise, noise-making systems) 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. If openable windows are not part of the background or permanent ventilation strategy, then these should be assumed to be closed for the purposes of calculation and closed for measurements.
2. Noise from occupants and office equipment (e.g. computers) should not be included in the measurements.
3. Unless otherwise stated in the specific guidance, a rate of testing of at least 1 in 10 rooms or spaces of each performance level shall be subject to on-site performance testing.
4. 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.
5. 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.
6. T in L_{AeqT} is taken as the duration of the normal working day (typically 8 hours between 09.00 and 17.00).
7. 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.
8. Measurement periods of less than 30 minutes may give representative values for indoor ambient noise levels and may be utilised where this is the case. However, measurement periods shorter than 5 minutes should not be used.
9. Measurements should be taken in a minimum of three locations in rooms at a height of 1.2 m above the floor level and at least 1 m away from any surface.
10. The measured level of ambient noise should be used to determine compliance with the criteria for acoustically sensitive rooms. If at the time of acoustic commissioning it is not possible to measure ambient noise levels in the absence of construction or other extraneous noise sources that will not be present when the building is complete, then, for mechanical services the lower level of 35 dB, L_{Aeq} or the lowest design limit for the acoustically sensitive space should be used.

The above is intended as guidance for undertaking acoustic testing or measurements to demonstrate compliance with the performance requirements in BREEAM.

M2: Testing, measurement and calculation procedures – Residential institutions (long term stay)

M2.1: Frequency of testing

When the country does not have legislation regarding frequency of testing, the following guidance below sets out the number of airborne and impact sound insulation tests to be conducted between unit on each group or sub-group (see Definitions). Measurements of airborne and impact sound insulation should be made in accordance with the relevant part of the ISO 16283 series and should be performed by an SQA. Where a programme of pre-completion testing identifies that spaces do not meet the standards, remedial works must be undertaken in accordance with M4.

Sound insulation between units is assessed in habitable rooms with separating walls and floors between units.

As a minimum, one set of tests is required for every 10 units in a group (i.e. houses or apartments) and each sub-group (typically these are different construction type groups) is required. In the event of less than 10 units, one set of tests is carried out. The number of tests required are as follows:

Table 31: Composition of test set

Group type	Airborne tests – separating walls	Airborne tests – separating floors	Impact tests – separating floors	Total
Units with separating walls only. *e.g. houses or bungalows*	2	0	0	2
Units with separating walls and floors. *e.g. apartments*	2	2	2	6

The actual number of tests possible may be limited by the layout. Where this is the case then the SQA should clearly identify why the full number of tests was not feasible within the test report or covering correspondence.

Where a house is detached, no measurements are required, and the sound insulation credits can be awarded by default.

M2.2: Example of testing series and compliance

Example 1

If a development consists of three houses; one set of tests will be required:

— Two airborne sound insulation tests of separating walls between house units.

Example 2

If a development comprises 42 houses and 59 apartments; then five sets of tests between houses and 6 sets of tests between apartments will be required:

— 10 airborne sound insulation tests of separating walls between houses units
— 12 airborne sound insulation tests of separating walls between apartments
— 12 airborne sound insulation tests of separating floors between apartments
— 12 impact sound insulation tests of separating floors between apartments

M3: Part 2 and 3 scope of works

Where an SQA confirms that it is not possible to meet the indoor ambient noise and/or sound insulation criteria in accordance with the relevant tables in full, due to the scope of works. Compliance can be demonstrated with the below, through measurement and assessment by an SQA:

Core services (Part 2)

— Do not change the indoor ambient noise levels where local services or break in noise dominate;

OR

— Reduce the indoor ambient noise levels.

Local services (Part 3)

— Do not change the indoor ambient noise levels where noise break-in through the building envelope is dominant and maintain sound insulation between noise-sensitive spaces;

OR

— Reduce the indoor ambient noise levels and maintain sound insulation between noise-sensitive spaces.

M4: Remedial works

Where a programme of pre-completion testing identifies that spaces do not meet the standards for indoor ambient noise, sound insulation, or reverberation times, remedial works must be carried out prior to handover and occupation, and the spaces retested to ensure compliance. Remedial works must be carried out to all affected and potentially affected areas, including rooms or spaces previously untested of a similar construction and performance requirement.

Compliance notes

Ref	Terms	Description
CN1	Other appropriate good practice standards or regulations	As detailed in the assessment criteria it is possible to use a national or local equivalent to the BREEAM requirements stated; however this must be approved by BRE Global. The Approved Standards list can be used to check for previously approved standards or to propose a new national or local standard.
CN1.1	Speech Privacy Potential	Where privacy is required or the ambient targets include a minimum as well as maximum limit, the Speech Privacy Potential (SPP) may be considered. The SPP is the sum of the weighted level difference of the partition (DW) and the measured ambient background noise level in the receive room (LA or NR (dBA)). To ensure the desired minimum background sound level necessary to achieve speech privacy, productivity and/or comfort goals, a sound masking system may be required. The sound masking system should be installed and in operation at the time of the acoustic testing to demonstrate compliance.
CN1.2	Reverberation times	Where the reverberation time required by the relevant standard is not appropriate for the type of space or building being assessed, the SQA must confirm why this is the case. In addition the SQA must set alternative appropriate reverberation times at the design stage and provide these to demonstrate compliance.
CN1.3	Programme of testing	It is not acceptable to undertake a shorter test programme due to site readiness on the day of testing. If this issue arises additional testing should be scheduled. It may be that testing at less than the typical regime identified would be acceptable in some instances. Where this is the case, clear reasoning must be provided by the SQA prior to awarding the credits.
CN1.4	Internal partition sound insulation criteria to internal doors	Where sound insulation criteria apply to internal partitions the calculations do need to include any doors which are part of the wall in question. While sound insulation performance of a typical door will be lower than for a typical wall, with careful design, specification and detailing, this can be overcome.
CN1.5	Mixed-use buildings	In the case of a mixed-use buildings, the 'Acoustic performance' credits are adjusted to account for the credits available when this differs for the asset types present. See Guidance Note 20 (GN20) for full details. Criteria for all relevant function areas must be achieved. Where the project contains a mix of residential institutions and non-residential function areas, then the following credit scoring applies:

Non-residential credits achieved	1	2	3	
Residential institutions (long-term stay) and credits achieved	1		3	4
Overall credits achieved	1	2	3	4

Ref	Terms	Description
CN1.6	Historic buildings	For historic buildings, full credits available can still be achieved where full compliance has not been met where confirmation is provided from an SQA that the design has improved the acoustic performance as much as possible taking into account the restrictions as detailed in a report from a conservation officer.
Building type specific		
CN2	Long term stay residential institutions. Rooms not covered by residential criteria.	Long term stay residential institutions often contain a mixture of 'non-residential' areas such as offices, small retail outlets, meeting rooms etc. and residential areas, e.g. self-contained dwellings or rooms for residential purposes. Where less than 5% of the floor area of the assessed building includes 'non-residential' areas, these areas do not need to be assessed, hence only the residential spaces need to be assessed against the residential criteria to demonstrate compliance with criterion 8 on page 149. Where more than 5% of the floor area of the assessed building includes areas other than self-contained dwellings or rooms for residential purposes: — If awarding 1 credit, only the self-contained dwellings or rooms for residential purposes need to be assessed to demonstrate compliance. — If awarding 3 or 4 credits the 'non-residential' areas must meet the relevant criteria for their function, and the self-contained dwellings or rooms for residential purposes need to be assessed to demonstrate compliance. The calculation for the percentage of floor area that is 'non-residential' should only include occupied spaces.
CN2.1	Hotel type – Sound insulation	Bedrooms in hotels must be considered acoustically sensitive rooms. Sound insulation (DnT,w) for partitions and floors between rooms and between rooms and corridors should be > 50 dB.
CN2.2	Residential only – Acoustic testing	Testing should be between habitable rooms on the ground floor and at higher storey levels, if applicable. Where there are not enough suitable separating walls or floors in a development to carry out the number of tests specified in the relevant national regulations or standards, all of the available suitable separating walls or floors must be tested. Note: separating walls can be defined as those walls which separate dwellings.
CN2.3	Residential only – Mixed use developments	For mixed use developments where commercial premises share a separating wall or floor with residential spaces, a SQA shall propose an appropriate baseline performance making reference to national or international guidance, or good practice.
CN2.4	Residential only – Commercial space	Where a commercial space is separated from a dwelling or room for residential purposes by a separating wall or floor, testing shall be carried out between the commercial space and dwelling, with the commercial space being used as the source room irrespective of the volume.
CN2.5	Residential only – Pre-completion testing	No pre-completion testing is required where separating walls or floors only occur between non-habitable rooms, or non-habitable rooms and other spaces. In such cases, three credits can be awarded following an assessment by a SQA confirming that the constructions detailed would be capable of achieving the relevant performance requirements. No pre-completion testing is required where the dwellings are detached. In such cases, four credits can be awarded by default.
CN2.6	Residential only – Measurement procedures	The appointed acoustician must confirm that the acoustic performance has been measured or calculated in accordance with these procedures. Where the acoustician has felt it necessary to deviate from these procedures, they must give justifiable reasons why they have done so.

Evidence

Criteria	Interim design stage	Final post-construction stage
Prerequisite – Suitably qualified acoustician		
1	Professional report or study from the acoustician providing early design advice.	No further actions required post-construction, no additional evidence is required other than

Criteria	Interim design stage	Final post-construction stage
	Evidence to verify that the acoustician meets the definition of a suitably qualified acoustician and were appointed at an appropriate design stage.	that listed for the design stage.
Acoustic performance standards		
2–7	The relevant section of the building specification, clauses of the contract or a letter of commitment to meet the relevant acoustic performance standards, carry out all pre-completion testing using an SQA and complete remedial work where necessary. Where available, a report from a suitably qualified acoustician (SQA) may be used to confirm required performance standards will be achieved.	Copy of acoustic field test results and calculations to show acoustic performance standards have been achieved and evidence to support they were completed by a compliant SQA.
Acoustic performance standards – Residential institutions (long-term stay)		
8–10	The relevant section of the building specification, clauses of the contract or a letter of commitment to meet the relevant acoustic performance standards, carry out all pre-completion testing by an SQA and complete remedial work where necessary. Where available, a report from a suitably qualified acoustician (SQA) may be used to confirm required performance standards will be achieved.	Copy of the sound insulation field test results and calculations to show the sound insulation performance standards have been achieved. Evidence to confirm the testing regime and support testing was completed by a compliant SQA.

Definitions

Acoustically sensitive rooms

Where the term 'acoustically sensitive rooms' is referenced in this BREEAM issue, it refers to any room or space the design team or client deems to be acoustically sensitive for the purposes of privacy, which may include the following types of space or rooms (where specified):

1. Single and multiple occupancy offices.
2. Meeting, interview, consulting or treatment rooms.

In addition:

1. Educational buildings or spaces: rooms for teaching and learning, i.e. classrooms, lecture theatres.
2. Rooms used for public speaking or seminars.
3. Any other room or space the design team or client deems to be acoustically sensitive for the purposes of privacy.

Cafe, canteen, catering kitchen, restaurants, bars

For the purposes of the acoustic performance credit:

— Informal cafés or canteen areas, catering kitchens are generally services provided by an organisation such as a college, factory, or company for its students or staff.

— Restaurants are places where food is served to the public on the premises. Compared to the above, restaurants can be independent and not ancillary, as per the BREEAM definition and scope.

— Bars are establishment where soft drinks or alcoholic drinks and sometimes other refreshments are served. They might be on their own or auxiliary to other functions, e.g. hotels.

Groups

A group is a similar type of unit – for example a group of homes of similar size, layout and design are considered a group, this is typically defined by groups of houses, apartments or bungalows. If significant differences in construction type occur within any of these groups, sub-groups should be established accordingly. This may be to recognise different acoustic conditions (for example, all the homes facing a busy road) or different construction types for separating walls (see sub-group).

Habitable rooms

For the purpose of this issue, habitable rooms include any room where individuals will sit or lie down and require a reasonably quiet environment to concentrate or rest. Such rooms are bedrooms, living rooms, dining rooms, studies, as well as kitchen-dining and kitchen-living rooms.

Indoor ambient noise level, L_{AeqT}

The measured indoor ambient noise level in the acoustically sensitive room, weighted for human sensitivity to different frequencies. For awarding design stage credits, the design ambient noise level can be used.

Lightweight roofs

Roofs that have a mass per unit area less than 150 kg/m²

Multiple occupancy offices

Office space that is not cellular in nature, i.e. it is open plan, and designed to accommodate more than two desk spaces or workstations.

Non-habitable rooms

For the purpose of this issue, non-habitable rooms include any room that is not considered a habitable room (as defined above). This includes rooms such as kitchens, bathrooms, toilets, hallways, garages and laundry rooms.

Occupied spaces

A room or space within the assessed building that is likely to be occupied for 30 minutes or more by a building user. Please note there is a specific, unrelated, definition of Unoccupied spaces on the next page with reference to acoustic testing and measurement – see below.

Pre-completion sound testing

Tests should be carried out once the build is essentially complete, but may be carried out prior to or post-decoration. In the case of dwellings, unless stated otherwise within relevant national building regulations or standards, the impact sound insulation tests should be carried out before floor finishes such as carpets, wood flooring or vinyl coverings have been installed.

Room for residential purposes

A room, or a suite of rooms which is not a dwelling (house or a flat) and which is used by one or more persons to live and sleep. It includes a room in a hostel, hotel, boarding house, hall of residence or residential home, whether or not the room is separated from or arranged in a cluster group with other rooms, but does not include a room in a hospital, or other similar establishment, used for patient accommodation.

Single occupancy offices

Cellular office space designed to accommodate one or two desk spaces or workstations (typically no greater than 10 m²).

Sub-groups

Rooms for residential purposes; sub-grouping should be by type of separating floor and type of separating wall. The construction of flanking elements (i.e. elements above, below and on either side of the space, for example walls, floors, cavities) and their junctions are also important. Where there are significant differences between flanking details, further sub-grouping will be necessary. Sub-grouping may not be necessary for rooms for residential purposes that have the same separating wall or separating floor construction, with the same associated flanking constructions, and where the room dimensions and layouts are broadly similar. Some rooms for residential purposes may be considered to have unfavourable features; an example could be

apartments with large areas of flanking wall without a window at the gable end. It would be inappropriate for these to be included as part of a group and these should form their own sub-groups. The SQA can use their judgement to define suitable sub-groups for assessment.

Suitably qualified acoustician (SQA)

An individual achieving all the following items can be considered to be 'suitably qualified' for the purposes of a BREEAM assessment:

1. Has a minimum of three years relevant experience (within the last five years). Such experience must clearly demonstrate a practical understanding of factors affecting acoustics in relation to construction and the built environment; including acting in an advisory capacity to provide recommendations for suitable acoustic performance levels and mitigation measures.
2. Holds a recognised qualification in acoustics and membership of an appropriate professional body.

Where an SQA is verifying the acoustic measurements or calculations carried out by another acoustician who does not meet the SQA requirements, they must, as a minimum, have read and reviewed the report and confirm in writing that they have found it to:

1. Represent good industry practice.
2. Be appropriate given the building being assessed and scope of works proposed.
3. Avoid invalid, biased and exaggerated recommendations.

Additionally, written confirmation from the third-party verifier that they comply with the definition of an SQA is required.

Unit

A unit is defined by the need to maintain privacy: typically, a self-contained dwelling like a house or apartment is a unit, but it could also be a sub-division within a residential institution. Where this is unclear, the SQA can use their judgement to define a unit for assessment.

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 out when the space is unoccupied.

Users with special hearing and communication needs

Users with special hearing or communication needs includes, but are not limited to, people with permanent hearing impairment or with severe or complex needs, including:

— speech, language, and communication difficulties
— visual impairments
— fluctuating hearing impairments caused by conductive hearing loss
— attention deficit hyperactivity disorder (ADHD)
— an auditory processing disorder or difficulty
— being on the autistic spectrum

Such users should be considered by the suitably qualified acoustician, along with the other points a-d when giving early design advice regarding room layout, sound insulation and reverberation times etc. The above is a typical list of users and is not intended to be a list mandatory requirement.

Weighted level difference, D_w

Single number quantity that characterises airborne sound insulation between rooms, but which is not adjusted to reference conditions. Note: Weighted level difference is used to characterise the insulation between rooms in a building as they are; values cannot normally be compared with measurements made under other conditions (see (EN) ISO 717-1).

Weighted standardised impact sound pressure level, $L_{nT,w}$

This is defined as the 'unit for rating impact airborne sound insulation on-site'.

Weighted standardised level differences, $D_{nT,w}$

This is defined as the 'unit for rating airborne sound insulation on-site'.

Additional information

Noise rating (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.

Hea 06b Acoustic performance

(all buildings, UK)

For buildings outside the UK, see Hea 06a Acoustic performance on page 147.

Aim

To ensure the building provides an appropriate acoustic environment to enhance the comfort of building users.

Overview

Assessment type	Credits available	Minimum standards	Applicable assessment criteria
Part 1: Fabric and structure	1	None	1.b, 2, 3.b (see ref 1.0 and 1.1)
Part 2: Core services	1	None	1.b, 2, 3.b (see ref 1.0–1.2)
Part 3: Local services	up to 3	None	1.a, 1.b, 2, 3.a, 3.b (see ref 1.2)
Part 4: Interior design	up to 3	None	1.a, 1.c, 2, 3.a, 3.c

Assessment type specific notes

Ref	Assessment type specific notes
1.0	**Alternative means of compliance** The basic built form has a large impact on the acoustic performance of the building and would be outside the control of the tenant. A suitably qualified acoustician (SQA) must carry out a quantifiable assessment of the specification of the built form, construction, and any external factors likely to affect the indoor ambient noise levels. The SQA must then confirm the developer's works will enable a future tenant utilising a typical fit-out and specification to meet the levels required to demonstrate compliance. Where the majority of a building's floor plan will require high performance acoustic environments (e.g. classroom/seminar buildings), then the BREEAM requirements must be achieved for the entire shell where specific layouts are not determined by the built form. One credit can be awarded where this has been achieved. Post-construction testing is not required subject to confirmation from the project team that the built form, construction, and any external factors have not changed from those used in the SQA's assessment.
1.1	**Bespoke performance requirements** When assessing criteria 2, only the acoustic principles applicable in criteria 1 or 3 should be assessed, i.e Part 1 and 2 assessments should only consider Indoor ambient noise level.
1.2	**Part 2 and/or Part 3 assessments** Where an SQA confirms that it is not possible to meet the indoor ambient noise **and/or** sound insulation criteria in accordance with the relevant tables in full due to the scope of works. Compliance can be demonstrated in accordance with M3.

Building type specific notes

Ref	Building type specific notes
2.0	**Residential institutions (short-term and long-term stay) and hospitality** When assessing a shell and core or shell only, only Indoor ambient noise level should be assessed.
2.1	**Prisons and law court buildings** For custodial spaces where anti-barricade cell doors are required, refer to Ministry of Justice standards for cell doors or equivalent doors approved by Ministry of Justice for use in cells.
2.2	**Building types without areas 'used for speech'**

Ref	Building type specific notes
	Where a building type does not have areas 'used for speech', it does not need to comply with the relevant 'room acoustics' criteria. In these instances, the credit available for room acoustics can be awarded by default where the building complies with the indoor ambient noise level and sound insulation criteria.

Assessment criteria

Up to three credits – Acoustic performance

For all building types, except residential institutions (short-term and long-term stay) and hospitality.

1 The building meets the appropriate acoustic performance standards and testing requirements defined in the relevant table below. These tables define criteria for the acoustic principles of:

1.a Sound insulation

1.b Indoor ambient noise level

1.c Room acoustics.

OR

2 A suitably qualified acoustician (SQA) is appointed to define a bespoke set of performance requirements for all function areas in the building. The bespoke performance requirements use the three acoustic principles defined in criterion 1, setting out the performance requirements for each and the testing regime required.

Table 32: BREEAM acoustic criteria for education buildings

Education buildings (three credits)	
First credit – Sound insulation	
Criteria	Achieve the performance standards set out in Section 1 of Building Bulletin 93: Acoustic design of schools: performance standards, February 2015 (BB93) relating to airborne sound insulation between spaces and impact sound insulation of floors.(58)
Testing requirement	A programme of pre-completion acoustic testing is carried out by a compliant test body in accordance with the BB93 requirements and the Association of Noise Consultants (ANC) Good Practice Guide, Acoustic testing of Schools.(59)
Second credit – Indoor ambient noise levels	
Criteria	Achieve the indoor ambient noise level standards set out within Section 1 of BB93 for all room types.
Testing requirement	A programme of pre-completion acoustic testing is carried out by a compliant test body in accordance with the ANC Good Practice Guide, Acoustic testing of schools.
Third credit – Room acoustics	
Criteria	Room acoustics (Control of reverberation, sound absorption and speech transmission index (STI)): **Teaching and study spaces** achieve the requirements relating to reverberation time for teaching and study spaces set out within Section 1 of BB93. **Open plan teaching spaces** achieve the performance requirements relating to reverberation time and STI set out within Section 1 of BB93. **Corridor and stairwells**, for those that give direct access to teaching and study spaces, achieve the performance requirements relating to sound absorption.
Testing requirement	**Teaching and study spaces:** A programme of pre-completion acoustic testing is carried out by a compliant test body in accordance with the requirements of BB93 and ANC Good Practice Guide, Acoustic testing of schools. **Open plan teaching spaces:** A programme of pre-completion acoustic testing of reverberation time is carried out within open plan teaching spaces. The measurement is carried out by a compliant test body in accordance with the requirements of BB93 and ANC Good Practice Guide, Acoustic testing of schools. STI testing is not required. To demonstrate compliance the SQA shall undertake measurements of reverberation times to compare against the STI model. The SQA should provide a report confirming that the surface finishes and distribution of sound absorption within the completed space is in line with the

Education buildings (three credits)	
	design intent implemented within the STI model. Where significant changes or differences are observed, the SQA shall re-model the space accordingly to demonstrate that the STI measurement is met by the completed spaces. **Corridors and stairwells:** Installation of a specification compliant with the BB93 criteria demonstrates compliance. A site inspection by the developer or SQA is required to confirm that a compliant specification has been installed.

Table 33: BREEAM acoustic criteria for healthcare buildings

Healthcare buildings (three credits)	
First credit – Sound insulation	
Criteria	Achieve the airborne sound insulation performance standards set out in Section 2 of HTM 08-01: Acoustic design requirements, 2013 determined according to the privacy requirements using both Table 3 and Table 4 from HTM 08-01.(60) The weighted standardised impact sound pressure level (L'nT,w) must not exceed 65 dB for floors over noise-sensitive rooms, following the guidance in HTM 08-01. For assessments in Scotland, see also Country-specific guidance on page 168.
Testing requirement	A programme of pre-completion acoustic testing is carried out by a compliant test body in accordance with the requirements of Section 7 of HTM 08-01. For assessments in Scotland, see also Country-specific guidance on page 168
Second credit – Indoor ambient noise levels	
Criteria	The indoor ambient noise requirements for noise intrusion from external sources in Table 1 of HTM 08-01 are not exceeded. The values for internal noise from mechanical and electrical services in Table 2 of HTM 08-01 are not exceeded. For assessments in Scotland, see also Country-specific guidance on page 168.
Testing requirement	A programme of pre-completion acoustic testing is carried out by a compliant test body in accordance with the Section 7 of HTM 08-01: Acoustics. For assessments in Scotland, see also Country-specific guidance on page 168.
Third credit – Room acoustics	
Criteria	Acoustic environment (Control of reverberation and sound absorption): Achieve the requirements relating to sound absorption set out in Section 2 of HTM 08-01. For assessments in Scotland, see also Country-specific guidance on page 168.
Testing requirement	Installation of a specification compliant with the HTM 08-01 criteria demonstrates compliance. A site inspection by the developer or SQA is required to confirm that a compliant specification has been installed.

Table 34: BREEAM acoustic criteria for office buildings

Office buildings (three credits)	
First credit – Sound insulation	
Criteria	The sound insulation between rooms and other occupied areas complies with the performance criteria given in Section 7 of BS 8233:2014.(61) This should be based on the layout and function of the different spaces within the building.
Testing requirement	A programme of pre-completion acoustic testing is carried out by a compliant test body in accordance with the acoustic testing and measurement procedures outlined in the Methodology on page 164.
Notes	If testing is to be carried out where the office is not yet furnished, then section 7.5 of BS 8233:2014 should be referred to when determining the performance criteria. Where the office is to be furnished at the time testing is carried out, then refer to section 7.7.6 of BS 8233:2014 for the relevant performance criteria.
Second credit – Indoor ambient noise levels	
Criteria	Achieve indoor ambient noise levels that comply with the design ranges given in Section 7 of BS 8233:2014.
Testing requirement	A programme of pre-completion acoustic testing is carried out by a compliant test body in accordance with the acoustic testing and measurement procedures outlined in the Methodology on

Office buildings (three credits)	
	page 164.
Third credit – Room acoustics	
Criteria	Acoustic environment (control of reverberation and sound absorption): Achieve the requirements relating to sound absorption and reverberation times, where applicable, set out in Section 7 of BS 8233:2014.
Testing requirement	A programme of pre-completion acoustic testing is carried out by a compliant test body in accordance with the acoustic testing and measurement procedures outlined in the Methodology on page 164. For spaces where the acoustic environment is controlled through the use of defined amounts of sound absorption, installation of a specification compliant with the BS 8233:2014 criteria demonstrates compliance. A site inspection by the developer or SQA is required to confirm that a compliant specification has been installed.

Table 35: BREEAM acoustic criteria for law court buildings

Law court buildings (three credits)	
First credit – Sound insulation	
Criteria	The sound insulation between acoustically sensitive rooms and other occupied areas complies with the performance targets given in BS 8233:2014 and the section on 'Acoustics' in Chapter 5 of the Court and Tribunal Design Guide (CTDG).(62)
Testing requirement	A programme of pre-completion acoustic testing is carried out by a compliant test body in accordance with the requirements of BS 8233:2014, the Court and Tribunal Design Guide (CTDG), and the methodology section below on 'Testing, measurement and calculation procedures' (where applicable).
Second credit – Indoor ambient noise levels	
Criteria	Achieve indoor ambient noise levels that comply with the requirements of BS 8233:2014 and the section on 'Acoustics' in Chapter 5 of the Court and Tribunal Design Guide (CTDG).
Testing requirement	A programme of pre-completion acoustic testing is carried out by a compliant test body in accordance with BS 8233:2014 and the Court and Tribunal Design Guide (CTDG).
Third credit – Room acoustics	
Criteria	Acoustic environment (Control of reverberation and sound absorption): Achieve the requirements relating to sound absorption and reverberation times, where applicable, set out in Chapter 5 of the Court and Tribunal Design Guide (CTDG).
Testing requirement	A programme of pre-completion acoustic testing is carried out by a compliant test body in accordance with Chapter 5 of the Court and Tribunal Design Guide (CTDG) and the methodology section below on 'Testing, measurement and calculation procedures' (where applicable).

Table 36: BREEAM acoustic criteria for all building types (excluding education, healthcare, office, and law courts)

All other building types (three credits)	
First credit – Sound insulation	
All room functions	
Criteria	The sound insulation between rooms and other occupied areas complies with the performance criteria given in Section 7 of BS 8233:2014. Alternatively, propose performance standard based on demonstrably best practice.
Testing requirement	A programme of pre-completion acoustic testing is carried out by a compliant test body in accordance with the acoustic testing and measurement procedures outlined in the Methodology on page 164.
Rooms with specific functions	Educational space (teaching and lecture spaces) refer to Table 32 on page 160. Medical treatment rooms refer to Table 33 on the previous page
Second credit – Indoor ambient noise levels	
Criteria	Achieve indoor ambient noise levels that comply with the design ranges given in Section 7 of BS 8233:2014.
Testing requirement	A programme of pre-completion acoustic testing is carried out by a compliant test body in accordance with the acoustic testing and measurement procedures outlined in the Methodology on

All other building types (three credits)	
	page 164.
Rooms with specific functions	Education space (teaching and learning spaces) refer to Table 32 on page 160. Medical treatment rooms refer to Table 33 on page 161.
Third credit – Room acoustics	
Criteria	Achieve the requirements relating to sound absorption and reverberation times, where applicable, set out in Section 7 of BS 8233:2014.
Testing requirement	A programme of pre-completion acoustic testing is carried out by a compliant test body in accordance with the acoustic testing and measurement procedures outlined in the Methodology on the next page. For spaces where the acoustic environment is controlled through the use of defined amounts of sound absorption, installation of a specification compliant with the BS 8233:2014 criteria demonstrates compliance. A site inspection by the developer or SQA is required to confirm that a compliant specification has been installed.
Rooms with specific functions	Educational space (teaching and learning spaces) refer to Table 32 on page 160. Medical treatment rooms refer to Table 33 on page 161.

Up to four credits – Acoustic performance for residential institutions (short-term and long-term stay) and hospitality

3 The building meets the appropriate acoustic performance standards and testing requirements defined in the relevant table below. These tables define criteria for the acoustic principles of:

3.a Sound insulation

3.b Indoor ambient noise level

3.c Room acoustics.

Table 37: BREEAM acoustic criteria for residential institutions (short term and long term stay) and hospitality

Residential institutions (short term and long terms stay) and hospitality – up to four credits	
First and second credit – Sound insulation	
Criteria	**One credit** Airborne sound insulation values are at least 3 dB higher and impact sound insulation values are at least 3 dB lower than the performance standards in the relevant building regulations or standards. **Two credits** Airborne sound insulation values are at least 5 dB higher and impact sound insulation values are at least 5 dB lower than the performance standards in the relevant building regulations or standards.
Testing requirement	A programme of pre-completion testing is carried out by a compliant test body based on the normal programme of testing described in the relevant building regulations or standards for every group or sub-group of dwellings (houses, flats or rooms for residential purposes) and this must demonstrate that the performance standards detailed within this table are achieved.
Third credit – Indoor ambient noise levels	
Criteria	Achieve indoor ambient noise levels that comply with the design ranges given in Section 7 of BS 8233:2014.
Testing requirement	A programme of pre-completion acoustic testing is carried out by a compliant test body in accordance with the acoustic testing and measurement procedures outlined in the Methodology on the next page.
Fourth credit – Room acoustics	
Criteria	Achieve the requirements relating to sound absorption within residential spaces and within the common spaces of the building described in the relevant building regulations or building standards national guidance.
Testing requirement	Installation of a specification compliant with the relevant building described in the relevant building regulations or building standards national guidance demonstrates compliance. A site inspection by the developer or SQA is required to confirm that a compliant specification has been installed.

Methodology

M1: Testing, measurement and calculation procedures

Where specific guidance on number of testing locations, measurement methods and calculation is not stated in the criteria tables above for the relevant building type, or within the relevant standard or guidance referenced, the following procedures can be followed by the acoustician when measuring or calculating the levels required to demonstrate compliance with this BREEAM issue.

Measurements of sound insulation (airborne and impact) should be made in accordance with the relevant part of BS EN ISO 16283(63) series, or the successor to these standards. Measurements should be conducted between one in four pairs of adjacent rooms (or teaching spaces) of each room type or performance requirements category and construction type.

Measurements of reverberation time should be made in accordance with the engineering grade (or better) requirements of BS EN ISO 3382-2:2008(64) and conducted within one in four rooms (or teaching spaces) of each room type of performance requirement category and construction type.

For measurements of ambient noise, when no specific guidance is available, the following procedures should be used:

1. Noise from both internal sources (e.g. mechanical ventilation systems, plant noise, noise-making systems) and external sources (e.g. traffic noise transmitted via the building façade) should be included. Also, where windows are openable as part of the ventilation strategy, these should be assumed to be open for the purposes of calculations and measurements. If openable windows are present but do not form part of the background or permanent ventilation strategy, then these should be assumed to be closed for the purposes of calculations and measurements.
2. Noise from occupants and office equipment (e.g. computers) should not be included in the measurements.
3. Unless otherwise stated in the specific guidance, a rate of testing of at least one in ten rooms or spaces of each performance level shall be subject to on-site performance testing.
4. 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.
5. 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.
6. T in $L_{Aeq,T}$ is taken as the duration of the normal working day (typically 8 hours between 09.00 and 17.00).
7. Measurements need not be made over a period of 8 hours if a shorter measurement period would be suitably representative. In this case, measurements should be made when external noise levels are representative of normal conditions throughout the day.
8. Measurement periods less than 30 minutes may give representative values for indoor ambient noise levels and may be utilised where this is the case. However measurement periods shorter than 5 minutes should not be used.
9. Measurements should be taken in a minimum of three locations in rooms at a height of 1.2m above the floor level and at least 1m away from any surface.
10. The measured level of ambient noise should be used to determine compliance with the criteria for acoustically sensitive rooms. If at the time of acoustic commissioning it is not possible to measure ambient noise levels in the absence of construction or other extraneous noise sources that will not be present when the building is complete, then, for mechanical services the lower level of 35 dB, L_{Aeq} or the lowest design limit for the acoustically sensitive space should be used.

The above is intended as guidance for undertaking acoustic testing or measurement 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 reason for doing so and confirm that the alternative procedures are adequate for demonstrating that the building meets the acoustic performance requirements.

M2: Residential institutions (short-term and long-term stay) and hospitality

Residential institution – long term stay and other residential institutions often contain a mixture of non-residential areas such as offices, small retail outlets, meeting rooms etc. and residential areas, e.g. self-contained dwellings or rooms for residential purposes. Where less than 5% of the assessed building's floor area is 'non-residential', these areas do not need to be assessed, only residential spaces are assessed against the residential criteria in Table 37 on the previous page. Where more than 5% of the assessed building's floor area includes areas other than for residential purposes, the 'non-residential' areas must meet the relevant criteria for their function for sound insulation, indoor ambient noise levels and room acoustics, as set out in the criteria for Table 36 on page 162 for 'other buildings' as well as the self-contained dwellings or rooms for residential purposes. Only include

occupied spaces covered by the 'other buildings' criteria in the calculation for the percentage of 'non-residential' floor area. The 'other building' criteria should be used even when the area uses, such as offices, have their own criteria.

M3: Part 2 and 3 scope of works

Where an SQA confirms that it is not possible to meet the indoor ambient noise and/or sound insulation criteria in accordance with the relevant tables in full, due to the scope of works. Compliance can be demonstrated with the below, through measurement and assessment by an SQA:

Core services (Part 2)

- Do not change the indoor ambient noise levels where local services or break in noise dominate;

  OR

- Reduce the indoor ambient noise levels.

Local services (Part 3)

- Do not change the indoor ambient noise levels where noise break-in through the building envelope is dominant and maintain sound insulation between noise-sensitive spaces;

  OR

- Reduce the indoor ambient noise levels and maintain sound insulation between noise-sensitive spaces.

Compliance notes

Ref	Terms	Description
CN1	Reverberation times	Where the reverberation time required by the relevant standard is not appropriate for the type of space or building being assessed, the SQA must confirm why this is the case. In addition the SQA must set alternative appropriate reverberation times at the design stage and provide these to demonstrate compliance.
CN1.1	Remedial works	Where a programme of pre-completion testing identifies that spaces do not meet the standards, remedial works must be carried out. The remedial works should occur prior to handover and occupation and the spaces re-tested to ensure compliance. Remedial works must be carried out to all affected and potentially affected areas, including rooms or spaces of a similar construction and performance requirement that were previously untested. The test report, or covering correspondence, should include a clear statement that the testing is in accordance with the required standard (where specified) or the BREEAM criteria and include the relevant pass or fail criteria.
CN1.2	Speech Privacy Potential	Where privacy is required or the ambient targets include a minimum as well as maximum limit, the Speech Privacy Potential (SPP) may be considered. The SPP is the sum of the weighted level difference of the partition (D_W) and the measured ambient background noise level in the receive room (L_A or NR (dBA)). To ensure the desired minimum background sound level necessary to achieve speech privacy, productivity and/or comfort goals, a sound masking system may be required. The sound masking system should be installed and in operation at the time of the acoustic testing to demonstrate compliance.
CN1.3	Programme of testing	It is not acceptable to undertake a shorter test programme due to site readiness on the day of testing. If this issue arises additional testing should be scheduled. It may be that testing at less than the typical regime identified would be acceptable in some instances. Where this is the case, clear reasoning must be provided by the compliant test body prior to awarding the credits.
CN1.4	Internal partition sound insulation criteria to internal doors	Where sound insulation criteria apply to internal partitions the calculations do need to include any doors which are part of the wall in question. While sound insulation performance of a typical door will be lower than for a typical wall, with careful design, specification and detailing, this can be overcome.

<table>
<tr><th>Ref</th><th>Terms</th><th>Description</th></tr>
<tr><td>CN1.5</td><td>Mixed-use buildings</td><td>In the case of a mixed-use buildings, the Acoustic credits are adjusted to account for the credits available when this differs for the asset types present. See Guidance Note 20 (GN20) for full details.

Criteria for all relevant function areas must be achieved. Where the project contains a mix of residential institutions and non-residential function areas, then the following credit scoring applies:
<table>
<tr><td>Non-residential credits achieved</td><td>1</td><td>2</td><td>3</td><td></td></tr>
<tr><td>Residential institutions (short term and long-term stay) and Hospitality credits achieved</td><td>1</td><td>2</td><td>3</td><td>4</td></tr>
<tr><td>Overall credits achieved</td><td>1</td><td>2</td><td>3</td><td>4</td></tr>
</table>
</td></tr>
<tr><td>CN1.6</td><td>Historic buildings</td><td>For historic buildings, full credits available can still be achieved where full compliance has not been met where confirmation is provided from an SQA that the design has improved the acoustic performance as much as possible taking into account the restrictions as detailed in a report from a conservation officer.</td></tr>
<tr><td>CN1.7</td><td>Residential institutions – Room acoustics</td><td>The term ‘residential spaces’ in the room acoustics criteria, Table 37 on page 163, refers to areas that residents can access but are not common to all visitors. Examples could include a gym and swimming pool.</td></tr>
</table>

Evidence

Criteria	Interim design stage	Final post-construction stage
1, 3	The relevant section of the building specification, clauses of the contract or a letter of commitment to meet the relevant acoustic performance standards, carry out all pre-completion testing using a compliant test body and complete remedial work where necessary. Where available, a report from a suitably qualified acoustician (SQA) may be used to confirm required performance standards will be achieved.	Copy of acoustic field test results to show acoustic performance standards have been achieved and evidence to support they were completed by a compliant test body.
2	Professional report or study from the acoustician confirming the bespoke acoustic performance standards and testing regime. Evidence to verify that the acoustician meets the definition of a suitably qualified acoustician. The relevant section of the building specification, clauses of the contract or a letter of commitment to carry out all required pre-completion testing using a compliant test body and remedial works where necessary.	Copy of acoustic field test results to show acoustic performance standards have been achieved and evidence to support they were completed by a compliant test body.

Definitions

Acoustically sensitive rooms

Where the term 'acoustically sensitive rooms' is referenced in this BREEAM issue, it refers to any room or space the design team or client deems to be acoustically sensitive for the purposes of privacy, which may include the following types of space or rooms (where specified):

1. Single and multiple occupancy offices.
2. Meeting, interview, consulting or treatment rooms.

In addition:

1. Educational buildings or spaces: rooms for teaching and learning, i.e. classrooms, lecture theatres.
2. Rooms used for public speaking or seminars.
3. Any other room or space the design team or client deems to be acoustically sensitive for the purposes of privacy.

Café, canteen, catering kitchen, restaurants, bars

For the purposes of the acoustic performance credit:

— Informal cafés, canteen areas, or catering kitchens are generally services provided by an organisation such as a college, factory, or company for its students or staff.

— Restaurants are places where food are served to the public on the premises. Compared to the above, restaurants can be independent and not ancillary, as per the BREEAM definition and scope.

— Bars are an establishment where soft drinks or alcoholic drinks and sometimes other refreshments are served. They might be on their own or auxiliary to other functions, e.g. hotels.

Compliant test body

A compliant test body is defined as:

1. Organisations having United Kingdom Accreditation Scheme (UKAS) accreditation to the appropriate scope (for, e.g. to BS EN ISO/IEC 17025[65]), or who are accredited by a member of the International Accreditation Forum (IAF) (www.iaf.nu) to the appropriate scope OR
2. Organisations or individuals registered with the Association of Noise Consultants (ANC) Registration Scheme OR
3. Companies or individuals that have been declared competent by an organisation who can provide evidence that they follow the relevant principles of BS EN ISO/IEC 17024 (Conformity assessment - General requirements for bodies operating certification of persons)[66] in relation to BREEAM requirements.

Groups and sub-groups

As defined in the Building Regulations for England and Wales Approved Document E: Resistance to the passage of sound, section 1 (paragraphs 1.11–1.17). For example, flats and study bedrooms are usually considered as two separate groups, and if there are significant differences in construction type then the groups will need to be broken down into sub-groups. In addition to this, where there are steps or staggers greater than 300 mm between dwellings, dwellings without steps or staggers should be treated as a different sub-group to those with steps or staggers. This is because the presence of steps or staggers is likely to improve performance.

Habitable rooms

For the purpose of this issue, habitable rooms include any room where individuals will sit or lie down and require a reasonably quiet environment in which to concentrate or rest. Such rooms are bedrooms, living rooms, dining rooms, studies as well as kitchen-dining and kitchen-living rooms.

Multiple occupancy offices

Office space that is not cellular in nature, i.e. it is open plan, and designed to accommodate more than two desk spaces or workstations.

Occupied spaces

A room or space within the assessed building that is likely to be occupied for 30 minutes or more by a building user.

Room acoustics

This describes how sound behaves in an enclosed space in terms of the reverberation time (or degree of echo), overall noise levels and speech intelligibility. Room acoustics are influenced by room geometry and distribution of acoustic absorption either through the general room finishes or through the introduction of sound absorbing products.

Suitably qualified acoustician (SQA)

An individual achieving all the following items can be considered to be 'suitably qualified' for the purposes of a BREEAM assessment:

1. Has a minimum of three years relevant experience (within the last five years). Such experience must clearly demonstrate a practical understanding of factors affecting acoustics in relation to construction and the built environment; including, acting in an advisory capacity to provide recommendations for suitable acoustic performance levels and mitigation measures.
2. Holds a recognised qualification in acoustics and membership of an appropriate professional body. The primary professional body for acoustics in the UK is the Institute of Acoustics.

Where an SQA is verifying the acoustic measurements or calculations carried out by another acoustician who does not meet the SQA requirements, they must, as a minimum, have read and reviewed the report and confirm in writing that they have found it to:

1. Represent good industry practice.
2. Be appropriate given the building being assessed and scope of works proposed.
3. Avoid invalid, biased and exaggerated recommendations.

Additionally, written confirmation from the third-party verifier that they comply with the definition of an SQA is required.

Users with special hearing and communication needs

Users with special hearing or communication needs includes, but are not limited to, people with permanent hearing impairment or with severe or complex needs, including:

— speech, language and communication difficulties
— visual impairments
— fluctuating hearing impairments caused by conductive hearing loss
— attention deficit hyperactivity disorder (ADHD)
— an auditory processing disorder or difficulty
— being on the autistic spectrum

Such users should be considered by the suitably qualified acoustician when giving early design advice regarding room layout, sound insulation and reverberation times etc. The above is a typical list of users and is not intended to be a list of mandatory requirements.

Additional information

Law court buildings

The latest guidance for law court buildings is the Court and Tribunal Design Guide (CTDG), which is available from: www.gov.uk/government/publications/court-and-tribunal-design-guide

You need to make sure you follow the key metrics for Optimum Reverberation with the correct units (seconds). See the 'Acoustics' section in Chapter 5 of the Court and Tribunal Design Guide (CTDG).

Country-specific guidance

The following standards or building regulations are relevant for the assessment of this issue.

England
For residential institution - long term stay assessments, where the criteria refer to the performance standards in building regulations, in England, this is referring to Approved Document E 2003 edition, with amendments 2004, 2013 and 2015 – Resistance to the passage of sound.(67)

Northern Ireland
For residential institution - long term stay assessments, where the criteria refer to the performance standards in building regulations, in Northern Ireland, this is referring to - DOE Technical Booklet G - Sound 2012.

Scotland
For healthcare buildings, where the criteria refer to the use of HTM 08-01, assessments in Scotland should use SHTM 08-01.(68)

For residential institution - long term stay assessments, where the criteria refer to the performance standards in building regulations, in Scotland, this is referring to Domestic Technical Handbook 2023 – Section 5, Noise.(69)

Wales
For residential institution - long term stay assessments, where the criteria refer to the performance standards in building regulations, in Wales, this is referring to Approved Document E 2003 edition, with amendments 2004 and 2010 – Resistance to the passage of sound.

Noise rating (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.

Scotland
The Scottish regulations do not account for Ctr acoustic metric and therefore the BREEAM uplift for Scotland does not need to account for Ctr either.

Hea 07 Safe and accessible design

(all buildings)

Aim

To recognise measures that provide safe and secure access to and in the building.

Overview

Assessment type	Credits available	Minimum standards	Applicable assessment criteria
Part 1: Fabric and structure	3 + 1 exemplary	None	All (see ref 1.0 to 1.2)
Part 2: Core services	0	None	Not applicable
Part 3: Local services	0	None	Not applicable
Part 4: Interior design	2 + 1 exemplary	None	7, 8, 9–11 (see ref 1.0 to 1.2)

Assessment type specific notes

Ref	Assessment type specific note
1.0	**Outside space** For fully-fitted assessments, where the end-user is known, a compliant outside space must have suitable outdoor furniture installed. However, where justified by the design team, for a speculative assessment, it is sufficient to provide evidence that an appropriate 'seating area' is provided, including any associated hard landscaping, along with design drawings showing a suggested arrangement and type of furniture.
1.1	**Accessible design** Where accessibility features in Table 38 are not applicable to the assessed area, then the individual features can be filtered out, further described in M3. For example, if the assessment does not have car parking provision, the accessibility features 1.d and 1.e in Table 38 can be filtered out of the assessment. Justification for each exclusion must be made.
1.2	**Accessible design** A minimum of two features in four sections of Table 38 must be present to target this credit. See M3.1 for full details.

Building type specific notes

Ref	Building type specific note
2.0	**Prisons – Safe access and Outside space** In the case of an assessment of a prison building or development, the criteria apply only to publicly accessible areas outside of the secure perimeter zone (but still on the wider prison site). This could include visitor reception or waiting buildings, facilities or estates offices, storage buildings and visitor or staff parking.

Issue specific notes

Ref	Issue specific note
3.0	Where the development does not have any external site area that is relevant (as outlined in M1.1), then the 'Safe access' credit is filtered out.
3.1	Where the development does not have any external site area that is relevant (as outlined in M2.1), then the 'Outside space' credit is filtered out.

Assessment criteria

One credit – Safe access

Where external site areas form part of the assessed development (see M1.1) the following apply:

1 Dedicated cycle paths are provided which meet the following minimum width dimensions or suitable local design guidance:

- 1.a Where pedestrian and cycle routes are shared, the minimum total width of the combined path is 3.0 m.
- 1.b Where the cycle path is segregated from both the pedestrian route and roadway, the minimum width of the cycle path is 2.0 m and the pedestrian path is 1.5 m.
- 1.c Where the cycle route forms a part of the roadway, the minimum width of the lane is 1.5 m.

2 Dedicated and safe footpaths are provided on and around the site providing suitable links for the following:

- 2.a The site entrance to the building entrance.
- 2.b Car parks (where present) to the building entrance.
- 2.c The building to outdoor space.
- 2.d Connecting to off-site paths where applicable.

3 Where provided, pedestrian drop-off areas are designed off, or adjoining, the access road and provide direct access to pedestrian footpaths.

Where vehicle delivery access and drop-off areas form part of the assessed development, the following apply:

4 Delivery areas are not directly accessed through general parking areas and do not cross or share the following:

- 4.a Pedestrian and cyclist routes.
- 4.b Outside amenity areas accessible to building users and the general public.

5 There is a dedicated parking or waiting area for goods vehicles with appropriate separation from the manoeuvring area and staff and visitor car parking.

6 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.

One credit – Outside space

7 There is an outside space providing building users with an external amenity area.

One credit – Accessible design

8 The asset must contain at least 50% of the applicable accessibility features in any four sections of Table 38.

OR

9 The asset achieves bronze level certification from Access4you or higher.

One exemplary credit – Accessible design

10 The asset must contain at least 50% of the applicable accessibility features in any six sections of Table 38.

OR

11 The asset achieves silver level certification from Access4you or higher.

Checklists and tables

Table 38: Standard accessibility features

	Accessibility features
1. Access to the asset	a. Step-free external access (i.e. level, gentle slope or ramp) from the site boundary to the main entrance(s) or alternative accessible entrance of the asset. b. Handrails to external stepped and ramped access routes to the main entrance(s) or alternative accessible entrance of the asset. c. Entrance doors that are accessible to all users, particularly persons who use wheelchairs and those with limited physical dexterity, and are wide enough when open to allow unrestricted passage for a variety of users, e.g. those in wheelchairs, people carrying luggage, people with assistance pets, and parents with pushchairs and small children. d. Where car parking is provided for the asset, designated parking spaces for persons with disabilities are as close as possible to the main entrance(s) of the asset. e. Where car parking is provided for the asset and asset users include parents with young children, designated parking spaces for motorists accompanied by a child in a perambulator (pram) or pushchair (baby buggy).
2. Horizontal and vertical circulation	a. Corridors and passageways that are wide enough to allow all persons to pass through unimpeded or turn in a wheelchair. b. Internal doors that are easy to operate and wide enough to allow free passage for all persons, including those in wheelchairs. c. Handrails for internal stairs, steps and ramps. d. Accessible lift(s) or vertical and inclined lifting platforms that reach all accessible levels of the asset. e. Accessible horizontal and vertical emergency evacuation routes (e.g. in the event of fire) and facilities (e.g. evacuation chairs) or a strategy and plan for assisted evacuation.
3. Use of the asset's facilities	a. Power-operated entrance door(s) (e.g. via push pad or motion sensor). b. Controls and switches (e.g. door handles and locks, taps, activation devices, electric outlets and switches, etc.) that are easy to understand and operate, visible and at a suitable height. c. Where drinking water outlets are provided for asset users, outlets are accessible to persons with disabilities including those who use wheelchairs (a minimum of one per floor for regularly occupied areas). d. Where the asset contains audience and spectator facilities, e.g. lecture and conference facilities, entertainment facilities (e.g. theatres, cinemas, etc.) and sports facilities, accessible space and seating for persons who use wheelchairs, those with mobility and sensory impairment and their companions. e. Where sleeping accommodation is provided (e.g. hotels), a proportion of the accommodation is designed for use by persons who use wheelchairs.
4. Sanitary accommodation	a. Toilet(s) with an assistance alarm accessible by those who use wheelchairs, at least one of which is a gender-neutral facility. b. Where asset users include parents or carers with young children, baby changing facilities accessible for parents or carers regardless of their gender. c. Where showers, bathrooms or changing rooms are provided for asset users, accessible versions to accommodate persons who use wheelchairs, persons with limited mobility, etc.
5. Orientation and wayfinding	a. Well-planned layouts that clearly identify key elements such as entrances, reception areas, sanitary facilities, etc. b. Good lighting conditions with additional illumination at decision points such as access routes, entrances, staircases, lifts, etc. c. Clear information and signage that is legible and easily understood, including availability in different languages where appropriate to the asset's location. d. Use of visual contrast and colour to facilitate orientation and navigation, to provide warnings about potential hazards, and to facilitate reading of information and signs. e. Provision of tactile information, e.g. embossed signage, Braille signage, tactile walking surface indicators (TWSI), tactile maps, models and plans, changes in floor surface, changes in level, tapping rails.

Accessibility features	
	f. Audible communication and sounds, e.g. talking signs, announcement systems, audio descriptive way-finding information, changes in walking surface. g. Use of scents or smells to provide additional orientation cues.
6. Assistive technologies	a. Hearing enhancement system(s) (e.g. induction loop) at service or reception counters and in rooms and spaces used for meetings, lectures, classes, performances, spectator sport or films. b. Audible information systems. c. Visual alarm systems. d. Voice or touch screen operated controls.
7. Inclusive spaces	a. All-gender and/or family sanitary accommodation. b. A Changing Places (CP) facility. c. Resting places available at regular intervals along external and internal circulation routes. d. Quiet, wellness, prayer or meditation room(s). e. Lactation room(s). f. Assistance animal relief (toilet) area(s). g. Accessible and inclusive fitness spaces and equipment. h. Spaces that promote regular informal social interactions and information exchange with different asset users.

Methodology

M1: Safe access

M1.1: Applicability of issue

The safe access criteria apply to developments when the boundary of the assessed development area includes external areas, such as pedestrian paths, access routes and external parking. Where the assessed building has no external areas but does have a covered parking facility which cyclists, pedestrians or delivery vehicles access the building via this area, then the relevant safe access criteria apply, and this area must be assessed against those criteria. The external area must be assessed regardless of if the areas are managed by the future occupant or someone else.

The safe access criteria do not apply when there are no external areas within the assessment boundary, this includes when access to the building is direct from the public highway or footpath, i.e. there is no on-site vehicle access and parking areas. When the boundary of the assessed development area does not cover external areas but there are external areas on the wider site i.e part of the landlord area, these areas do not need to be assessed as they are outside of the assessment's control. When the safe access criteria do not apply, the credit can be filtered out, supporting evidence may be required to justify this.

M1.2: Dedicated footpaths

Where it is not practical to provide dedicated footpaths from each parking space within a car park, it is expected that design teams take every practical measure to ensure the safety of pedestrians. In general terms, as a minimum, a safe pedestrian route should be provided from the pedestrian exit of the car park to the building entrance. For larger car parks it would be beneficial to provide footpaths at regular intervals across it, to aid safe access from the car to the building entrance, and the design team should demonstrate that they have achieved this as far as is practical.

M1.3: Vehicle delivery access and drop-off

Criteria 4 and 5 (delivery access through general parking areas) can be relaxed for smaller sites if it can be confirmed that the building is of an operational type and size which is likely to mean that all deliveries to the building will be made by small vans and not heavy goods vehicles. Where dedicated delivery access and drop-off areas do not form part of the assessed development, these criteria – and criterion 6 – are not applicable.

M1.4: Suitable local design guidance

Suitable local guidance for appropriately sized, designed and constructed cycle, pedestrian and vehicle access can be selected by the assessor. The following UK publications offer guidance on how to demonstrate this:

a. Local Transport Note 1/20 Cycle Infrastructure Design (Department of Transport, 2020).

b. Sustrans design guidance (www.sustrans.org.uk), specifically the Sustrans Design Manual – Handbook for cycle-friendly design (Sustrans, 2014).

M2: Outside space

M2.1: Applicability of issue

The outdoor space criteria apply to all assessments with external space. The criteria can be filtered out where:

— It is not possible to provide outdoor space, due to statutory requirements, or other issues outside of the control of the developer and the project boundary.

— The external space available is used for key access requirements, such as safe access criteria 1-6.

— The external space available is on a roof top, and local planning requirements for M&E plant, photovoltaic panels and green roofs are prioritised.

M2.2: Appropriate size of outside space

When determining the appropriate size of the outside space, the building type, function, shift patterns and occupancy numbers should be considered. The space should be large enough to accommodate typical use during break periods without overcrowding, allowing users to gather, sit, and relax comfortably.

M3: Accessibility

M3.1: Applicability of issue

All sections and features in Table 38 are applicable to each assessment, unless filtered out in line with Assessment type specific note 1.1 and M3.2.

Not every section and feature will be relevant to an assessment. If a section contains less than two applicable features, it cannot be used, as outlined in Assessment type specific note 1.2. If there are only two applicable features in the section, then both must be present for that section to count.

If there are less then four sections applicable to the project in Table 38, then this credit is not applicable and will be filtered out.

To meet compliance, 50% of applicable features in each section must be achieved, this must always be rounded up. For example, where three features apply, the 50% requirement is rounded up, meaning two features must be met in that case.

M3.2: Filtering of features

Accessibility features can take into account new as well as existing features. The intent is to encourage accessible design from the outset, ensuring that where influence can be made this is considered. In addition, where accessible design features cannot be influenced, projects are not negatively impacted by this, with the ability to filter out features, or where there is good accessible design then the existing features can be accepted.

Whether a feature is applicable or not depends on the ability to influence the final solution and the existing elements present. This is described in two scenarios. It is the assessor's responsibility to outline which features were deemed applicable or not and provide suitable evidence to support this. This may be in the form of drawings, reports or confirming the projects detail and scope as required.

Scenario 1 – A Part 1 only assessment

In the case where certain features will not be covered in the project scope but will be present within the fully fitted asset and there is the ability to influence the final solution, then these features must still be deemed applicable. For example, a Part 1 assessment will not be installing lifts in line with 2.d, however, can demonstrate that the lift shaft would be able to accommodate level and suitably sized lifts to each floor. If there was no way to influence the final solution, such as enabling the 'Assistive technologies', then the features are not applicable.

Scenario 2 – A Part 4 assessment

In this example, the project scope includes the fit out of two office floors, it does not cover the shell of the building and the landlord areas such as the building entrance. In this case the project scope does not cover works to the asset entrance, but if

step free access to the building entrance is already present, this can meet the accessibility feature 1.a. In addition, the layout of the corridors is already built and will not change, feature 2.a in Table 38 can therefore not be influenced. There are two options, either the existing corridors are assessed to meet the requirements and can be included, or if they do not, the feature can also be removed from the list of applicable features as it is outside the scope of the assessment.

M3.3: Access4you

Access4you International is an organization that evaluates, certifies, and qualifies the accessibility of the built environment. Their self-developed criteria system consists of 1000 aspects, which are based on the usability aspects of 8+1 stakeholder groups, including people with special mobility, visual, hearing, and cognitive needs. The rating system consists of Certified location, Bronze, Silver, or Gold qualifications.

Access4you has two schemes, the design scheme which is aligned with a new construction or major refurbishment project and the building scheme which is aligned with a fit out of an existing building. The most appropriate scheme, advised by Access4you should be used.

Compliance notes

Ref	Terms	Description
Safe access		
CN1	Cyclist safe access	Safe access for cyclists must be via a compliant cycle path, unless it is demonstrated that it would be impractical to cycle for a short distance between the site entrance and cycle storage. For example, where a gate, door or barrier forces the cyclist to dismount and walk for a short distance to access the cycle storage and it would be impractical for cyclists to re-mount. The intent is that this be a short distance, over which cyclists would typically not choose to re-mount and is anticipated to be no greater than 10 m. To be considered compliant for greater distances, evidence must be provided of effective additional physical measures to deter cyclists from re-mounting. Where it is not practical to provide compliant cycle path from the entrance to the cycle storage, the safety of cyclists and pedestrians must be maintained.
CN2	Dedicated cycle paths in the absence of cycle facilities	Safe cycle access needs to be provided even if there are no dedicated cycle facilities. The dedicated cycle paths will generally need to be provided in proximity to the main entrance(s) of the building along routes likely to be used by cyclists through the site. The design team are required to determine what is required to satisfy the intent of the criteria. Cycle access and cyclists' facilities are assessed independently of each other. Building users may cycle even if the building does not have cycle storage facilities and so safe and secure access to and from the building must be provided.
CN3	Vehicle delivery routes – safe access	Vehicle delivery routes which cross cycle or pedestrian routes may be acceptable provided there are adequate physical control measures in place to ensure safe access and thus minimise the possibility of delivery vehicles coming into conflict with cyclists and pedestrians. Examples of such measures could be vehicle barriers or retractable vehicle bollards, which only allow access to delivery vehicles when required and whose operation and controls account for cycle and pedestrian movements.
CN4	Restricted movement within a secure perimeter	Where the movement of pedestrians, cyclists and vehicles is tightly controlled within a secure perimeter due to security considerations, these areas do not need to strictly meet the safe access criteria. However, justification and evidence provided by an appropriate member of the project team must demonstrate how the layout, measures and secure nature of the site result in a safe environment for cyclists, pedestrians, and vehicle access, in line with intent of each criterion. Where a criterion is not applicable due to the secure nature of the site, this should be noted and justified in the assessment report.
Outside space		
CN5	Outside space – Public realm	As per the definition, compliant outside space must be non-smoking. This requirement precludes compliance for areas within the public realm, where a non-smoking policy would be unenforceable.
CN6	Outside space –	Where a building has existing external space, or will be developing new external space,

Ref	Terms	Description
	shared with other buildings	that is or will be shared with other buildings, this can be deemed acceptable if the space meets the definition of 'Outside space' and is of a size able to cater for the building users of all the associated buildings.

Evidence

Criteria	Interim design stage	Final post-construction stage
Safe access		
1–6	Design drawings (including a scaled site layout plan) highlighting safe pedestrian and cycle routes and other compliant features and dimensions. Where required, relevant sections of the building specification.	Final construction site layout plan or equivalent and assessor site inspection report and photographic evidence to confirm provision of compliant safe cycle and pedestrian access.
Outside space		
7	Design drawings (including a scaled site layout plan) showing provision of an adequate external space. Where required, relevant sections of the building specification or letter of commitment confirming the outside space will be in line with the definition for outside space.	Final construction site layout plan or equivalent and assessor site inspection report and photographic evidence to confirm provision of a compliant outside space. For projects not fully-fitted or speculative, the drawings should show indicative seating arrangements to demonstrate that the space provided is sufficient for future installation of furniture by the tenant.
Accessible design		
8, 10	Design drawings (including a scaled site layout plan) highlighting accessibility features and dimensions. Where required, relevant sections of the building specification. Supporting evidence to confirm which features and sections were deemed not applicable, where relevant.	Final construction site layout plan or equivalent and assessor site inspection report and photographic evidence to confirm provision of compliant accessibility features. Supporting evidence to confirm which features and sections were deemed not applicable, where relevant.
Accessible design (Access4you)		
9, 11	Relevant section or clauses of the building specification or contract. A signed and dated letter of commitment to meet the relevant criteria. And evidence of communication with Access 4you. OR Pre-certification assessment completed by Access4you	Final certification from Access4you.

Definitions

Accessibility

Provision of buildings, parts of buildings, or outdoor built environments for people, regardless of disability, age or gender, to be able to gain access to them, into them, to use them and exit from them.

Dedicated and safe cycle paths

Marked out and clearly signed routes to accommodate building users arriving on and travelling through the assessed site on a bicycle. They must also have the following features:

1. The lighting for access roads and cycle lanes is compliant with the external lighting criteria defined in Hea 02 Electric light, i.e. in accordance with the national best practice road lighting guide.
2. The term 'dedicated' is not intended to preclude cycle routes which are shared with pedestrians or vehicles. The assessor may deem such arrangements compliant, provided that they meet the requirements of suitable local design guidance referred to in the criteria.

Dedicated and safe footpaths

Marked out and clearly signed routes to accommodate building users arriving on and travelling through the assessed site on foot. They must also have the following features:

1. Dedicated pedestrian crossing points are provided where needed to allow pedestrians to cross vehicle access routes.
2. Appropriate traffic calming measures are in place to slow traffic at any crossing points.
3. Developments with high numbers of visitors provide signposting to other local amenities and public transport nodes off site (where existing).
4. The lighting for access roads and pedestrian routes is compliant with the external lighting criteria defined in Hea 02 Electric light, i.e. in accordance with the national best practice road lighting guide.

External site areas

Areas external to the assessed building, but within the development's site boundary, which contain vehicle or pedestrian access roads or pathways to the building, parking, unloading and drop-off areas.

Inclusive design

Approach to the design of the environment, including buildings and their surrounding spaces, and managed and natural landscapes, to ensure that they can be accessed and used by everyone.

Outside space

The space is of an appropriate size to provide enough amenity for the predicted number of building users during coffee or lunch breaks to gather, socialise, relax and connect with the natural environment. The space is predominantly intended for building staff, but can be used by other building users where relevant and beneficial to the building users. The outside space must:

1. Be an outdoor landscaped area, for example a garden, balcony or terrace; the majority of the space should be open to the sky.
2. Have appropriate seating areas.
3. Be non-smoking and controlled by building management (see CN5).
4. Be located to ensure it is accessible to all intended building users and avoids areas that will have disturbances from sources of noise (e.g. building services, car parks, busy roads, delivery areas etc.).
5. Be permanent and be away from roads or be visually screened.
6. Be on-site or in close proximity to the site (within 500m from the building entrance point).

Universal Design

Design of products, environments, programmes and services to be usable by all people, to the greatest extent possible, without the need for adaptation or specialised design. Universal Design does not exclude the need of assistive devices for particular groups or persons with disabilities where relevant. Terms such as "Universal Design", "accessible design", "Design for All", "barrier-free design", "inclusive design" and "transgenerational design" are often used interchangeably with the same meaning.

Additional information

Vehicle turning details

The Metric Handbook contains details of typical delivery or freight vehicle sizes and turning circles(70).

Best practice guidance for accessible design

Due to the variation in local legislation and design practices for accessibility, usability and inclusivity, the assessment criteria do not stipulate specific design requirements, dimensions or number of each type of feature within the asset. Therefore, compliance with the criteria must be determined by the Assessor's best judgement on what constitutes a reasonable level of provision and design of features for the type, size and number of users of the asset. Assessors may base their judgement using the following best practice guidance:

- ISO 21542:2021 Building construction - Accessibility and usability of the built environment
- BS 8300-1:2018 Design of an accessible and inclusive built environment - Part 1: External environment - Code of practice
- BS 8300-2:2018 Design of an accessible and inclusive built environment - Part 2: Buildings - Code of practice
- EN 17210:2021 Accessibility and usability of the built environment - Functional requirements
- Building for Everyone: A Universal Design Approach, Centre for Excellence in Universal Design, 2012 (http://universaldesign.ie/Built-Environment/Building-for-Everyone/)
- Americans With Disabilities Act and Architectural Barriers Act Accessibility Guidelines, United States Access Board, 2004
- Architectural Barriers Act (ABA) Standards, Department of Defense, General Services Administration and U.S. Postal Service, 2015

Alternatively, the Assessor may base their judgment using local standards where these have similar requirements to the above standards.

Principles of Universal Design

The Principles of Universal Design were developed in 1997 by a working group of architects, product designers, engineers and environmental design researchers at the North Carolina State University, with the purpose "to guide a wide range of disciplines including environments, products and communications". The seven principles "may be applied to evaluate existing designs, guide the design process and educate both designers and consumers about the characteristics of more usable products and environments". The seven principles are:

- Principle 1: Equitable Use – The design is useful and marketable to people with diverse abilities.
- Principle 2: Flexibility in Use – The design accommodates a wide range of individual preferences and abilities.
- Principle 3: Simple and Intuitive Use – Use of the design is easy to understand, regardless of the user's experience, knowledge, language skills, or current concentration level.
- Principle 4: Perceptible Information – The design communicates necessary information effectively to the user, regardless of ambient conditions or the user's sensory abilities.
- Principle 5: Tolerance for Error – The design minimises hazards and the adverse consequences of accidental or unintended actions.
- Principle 6: Low Physical Effort – The design can be used efficiently and comfortably and with a minimum of fatigue.
- Principle 7: Size and Space for Approach and Use – Appropriate size and space is provided for approach, reach, manipulation, and use regardless of user's body size, posture, or mobility.

Energy



Summary

This category encourages the specification and design of energy efficient building solutions, systems and equipment that support the sustainable use of energy in the building and sustainable management in the building's operation. Issues in this section assess measures to improve the inherent energy efficiency of the building, encourage the reduction of carbon emissions and support efficient management throughout the operational phase of the building's life.

Assessment issues

Ene 01 Energy and carbon performance for regulated energy uses	up to 12 credits + 3 exemplary
Ene 02 Prediction of operational energy and carbon	up to 12 credits + 4 exemplary
Ene 03 Energy monitoring	up to 2 credits
Ene 04 Low carbon design	up to 4 credits
Ene 05 Energy efficient equipment	up to 5 credits
Ene 06 Energy efficient systems	up to 9 credits
Ene 07 Flexible demand response	up to 2 credits
Ene 08 Installed controls	up to 2 credits

Ene 01 Energy and carbon performance for regulated energy uses

(all buildings)

Aim

To minimise the energy consumption and carbon emissions from regulated energy uses and to maximise the use of low carbon energy sources.

Overview

Assessment type	Credits available	Minimum standards	Applicable assessment criteria
Part 1: Fabric and structure	up to 12 + 3 exemplary	Excellent, Outstanding	All
Part 2: Core services	up to 12 + 3 exemplary	Excellent, Outstanding	All
Part 3: Local services	up to 12 + 3 exemplary	Excellent, Outstanding	All
Part 4: Interior design	0	None	Not applicable
EU Taxonomy	-	-	1 (see M6)

Assessment type specific notes

Ref	Assessment type specific note
-	None

Building type specific notes

Ref	Building type specific note
-	None

Issue specific notes

Ref	Issue specific note
-	None

Assessment criteria

Up to 12 credits – Calculated energy performance improvement

1 Calculate the energy performance improvement using either:

1.a **Option 1: Whole building energy model (UK only)**

1.b **Option 2: Asset energy calculator**

The percentage of available BREEAM credits awarded is given in Table 39 on the next page.

Table 39: Ene 01 EPR_{RFO} performance scale

Percentage of available credits awarded	EPR_{RFO}	Minimum standard
8%	0.0833	-
17%	0.1667	-
25%	0.2500	-
33%	0.3333	-
42%	0.4167	Excellent [note 1, note 2]
50%	0.500	
58%	0.5833	
67%	0.6667	Outstanding [note 1, note 2]
75%	0.7500	
83%	0.8333	
92%	0.9167	
100%	1.000	

Notes to Table 39

1. Alternatively, refurbishments that include Part 2 or Part 3 may meet the minimum OEP_{RFO} scores specified in Ene 02.

2. Alternatively, Part 1 only assessments may adopt the fabric performance optimisation approach specified in criterion 7 in Ene 04.

Historic buildings

Historic buildings assessing under either Option 1 or Option 2 may follow the standard historic buildings approach where the EPR_{RFO} score will be increased by 0.1666 (recurring) if criteria 2–6 are achieved, or alternatively use the alternative historic buildings approach and meet criteria 7.

Standard historic buildings approach:

2 A specialist study has been undertaken by a suitably qualified heritage conservation specialist at the Concept Design stage (equivalent to RIBA Stage 2), to investigate the implications of improving building fabric and services performance while minimising the potential negative impacts on the historic character of the building, the condition of the building fabric, or the indoor air quality.

3 The study includes looking at the potential for improving 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. This includes considering materials specified, impacts on breathability of the building, paying attention to additional ventilation that may be required e.g. roof, wall and floor voids.

4 The report makes recommendations for potential improvements to the building fabric in accordance with best practice guidance including:

- 4.a Energy Efficiency and Historic Buildings: Application of Part L of the Building Regulations to historic and traditionally constructed buildings, English Heritage.
- 4.b Guide Buildings: Application conversion of traditional buildings parts 1 and 2, application of the Scottish building standards, Historic Scotland.
- 4.c The Sustainable Traditional Buildings Alliance (STBA) Responsible Retrofit Guidance Tools (www.responsibleretrofit.org).

5 Each of the following (as a minimum) must be considered and recommendations for improvement made:

- 5.a Roof
- 5.b External/sheltered walls
- 5.c Ground floor
- 5.d Upper floors
- 5.e Windows and external doors

6 Where improvement cannot be made to any of the above (e.g. due to conservation or building performance issues), justification should be provided including the alternative measures that have been considered and reasons for these measures could not be adopted (e.g. glazing options considered etc.)

Where criteria 2–6 have been achieved the EPR_{RFO} score will be increased by 0.1666 (recurring).

OR

Alternative historic buildings approach:

7 Use the alternative approach for dealing with historic buildings outlined in M4.

Up to three exemplary credits – Beyond zero net regulated carbon

8 The building has been modelled using Option 1 or Option 2 and the modelling results demonstrates that at least 100% of the building's regulated energy requirements are met by eligible low and zero carbon (LZC) technologies (see M5).

9 The number of BREEAM credits awarded is based on the percentage of the building's operational energy use that is met by LZC sources (see Table 40 below).

Table 40: Exemplary credits for beyond net zero regulated carbon

BREEAM credits	Percentage of operational energy use that is met by LZC sources
1 exemplary	≥ 100% regulated energy use
2 exemplary	≥ 100% regulated energy use AND ≥ 50% unregulated energy use
3 exemplary	≥ 100% regulated energy use AND ≥ 100% unregulated energy use

Methodology

Overview

This issue measures the energy performance of installed building services and fabric of the refurbished building compared to the existing building prior to refurbishment and to a reference version of the building.

For Option 1 the energy performance of the reference building is included within the EPC file.

For Option 2 the technical specification for the reference building and its energy performance are defined within the BREEAM Platform.

Both Ene 01 options calculate the extent to which the refurbishment project has improved the energy performance of the regulated energy uses, specifically space heating, space cooling, mechanical ventilation systems, hot water systems, and lighting.

Both options calculate the annual average delivered energy consumption for regulated energy uses for the refurbished building, the building prior to refurbishment (the existing building) and, also a reference version of the building which represents a typical unimproved version of the building.

Both options assume the same standard occupancy pattern for the refurbished, existing and reference building based on the mix of building types within the assessment zone. The standard occupancy pattern reflects the typical daily hours of use across the year and heat gains from both occupants and from non-regulated energy using equipment and systems. This information determines the demand for each regulated energy services within the building.

The amount of delivered energy that is required to meet the service demand will vary depending on the energy efficiency of the installed services. For heating and cooling, both the climate and the building fabric and building dimensions will also affect the amount of delivered energy needed to meet the service demand.

For both options details of the building dimensions, the building servicing systems installed, and the thermal properties and airtightness for both the refurbished building and the existing building must be provided.

For both options building service and fabric details for the reference building do not need to be entered and are embedded in the energy calculators.

Both options employ an energy performance translator curve to translate the ratio of the energy performance metrics generated for the refurbished and existing building into energy performance ratio (EPR) scores.

M1: Option 1 – Whole building energy model – 12 credits available

This option is only applicable to buildings in England, Scotland, Wales or Northern Ireland

This option assesses the whole building and is most appropriate for major refurbishment projects that include substantial improvements to both fabric and building services. The number of available credits for Option 1 is fixed at 12 and when this method is applied to more minor refurbishment projects the number of credits awarded is likely to be low.

To calculate the number of credits for this option, EPCs must be generated for both the existing building and the refurbished building by an accredited energy assessor who enters the building services and fabric details into the approved software.

For assessments in England, Wales, or Northern Ireland, the EPC file must be generated for the county where the building is located.

For assessments in Scotland, EPC's must be generated for England even if the actual building is located elsewhere. This is due to differences in the structure of the epc.inp files between countries.

The epc.inp files generated for the existing and refurbished building must be uploaded on the BREEAM Platform to determine EPRs (Energy Performance Ratios) for three energy performance metrics: primary energy, carbon emissions, and demand for heating and cooling. The overall EPR_{RFO} is calculated as the mean (arithmetic average) of the EPRs for each energy performance metric.

M2: Option 2 – Asset energy calculator – up to 12 credits available

This option is applicable for all refurbishment projects.

The BREEAM asset energy calculator uses a simplified steady-state modelling approach to determine the energy performance of both the refurbished building and the existing building compared to a reference version of the building.

The reference building is a theoretical version of the refurbished building that has the same floor area and dimensions as the refurbished building, has the same proportions of serviced floor area, contains the same mix of building types, and is in the same location as the existing building.

The reference building is assigned typical annual energy use for each of the five regulated energy uses (space heating, space cooling, mechanical ventilation and lighting) for the same building type mix in the same location as the refurbished building.

M2.1: Determining in-scope building servicing systems

The scope of fabric and services to be included in the assessment is determined by the Parts that are being assessed and the area(s) within the building that are included in the assessment zone.

The systems that are included in the assessment are determined by the Parts that are being assessed according to Table 41 below.

Table 41: The components and systems that are included based on the Parts included in the assessment

Assessment Parts	Applicable components and systems
Part 1: Structure and fabric	Fabric performance share of space heating
Part 2: Core services Systems that provide central services plus Local systems that provide services in common areas	Space heating
	Space cooling
	Mechanical ventilation (central)
	Hot water
	Lighting
Part 3: Local services All systems that provide services in separately tenanted areas	Space heating
	Space cooling
	Ventilation
	Hot water
	Lighting

For assessments that include Part 1, Part 2, and Part 3, the maximum of 12 credits will be available.

For other assessments the number of credits available reflects the proportion of total building energy consumption for the Parts that are included in the scope of the assessment.

The number of credits available is calculated in the BREEAM Platform based on the Parts that are being assessed, the building location and the information entered on the building types and percentage of treated floor area that is provided by in-scope systems. This information is used to calculate the proportion of regulated energy use that falls within the scope of the refurbishment which determines the number of credits available.

The BREEAM Platform is structured to only display questions that are relevant for the assessment scope e.g., only requiring fabric details where Part 1 is included in the assessment and in-scope servicing systems details for Part 2 or Part 3 assessments.

For Part 3, local servicing systems in tenanted or functional areas of the building will be in-scope, whilst for Part 2, core servicing systems and local systems in common areas will be in scope.

M2.2: Data entry requirements

The calculation will only run when all mandatory questions that are relevant for the Parts being assessed have been entered into the BREEAM Platform, and error messages will indicate where mandatory questions have not been answered.

To ensure a fair comparison of energy performance, the asset energy calculator assumes the same building dimensions, serviced floor areas, and the mix of building types for the existing building as the refurbished building.

This means that for refurbishment projects where the floor area that is served by building servicing systems has been increased, for example, a cooling system is installed as part of the refurbishment where previously the floor area was not cooled for the existing building, details must be entered for a servicing system that meets minimum local energy performance requirements.

Conversely, where the serviced area has been decreased, for example, a cooling system has been removed and not replaced, then the servicing system that has been removed should be left out when entering details of the cooling systems for the existing building.

The BREEAM Platform will flag an error where the total treated floor area for each servicing system (space heating, space cooling, mechanical ventilation and hot water) in the refurbished building does not match those in the existing building prior to fit out.

Data entry requirements – Scoping questions

The following data must be entered before the calculation can proceed.

Within the building details section:

- Composition of the asset – asset type(s) and floor area(s) – this determines the energy performance for the reference building.
- Project scope – Parts being assessed – this determines the credits available and the data entry requirements.
- If the project includes an extension – this affects the data entry requirements.
- Statutory historic buildings constraints – this affects the scoring.

Within Ene 01 (Energy and carbon performance for regulated energy uses), the following questions must also be answered:

- Building services present.
- Percentage of floor area mechanically ventilated.

These scoping questions determine the data entry requirements.

Data entry requirements – Part 1 – Fabric

For the refurbished building:

- Dimensions of external wall, roof, and windows within or adjacent to the assessment zone plus the volume of the assessment zone (including extension if present).
- Identify fabric elements improved during the refurbishment project.
- Enter weighted average U-values and, glazing g value for improved elements (excluding extension, if present).

— Confirm whether external solar shading is present, the building air leakage rate, if known, and whether a thermographic study with appropriate remedial action was carried out.

For the existing building where fabric element has been improved:

— Enter U-values of fabric elements, g value glazing prior to refurbishment (excluding extension, if present).

For the extension, if present:

— Dimensions of external wall, roof, and windows adjacent to the assessment zone for the extension only.

— Area weighted U-values for external wall, roof, and windows for the extension.

— U-values for external wall, roof, and windows that would just meet local building regulations.

Data entry requirements – Part 2 or Part 3 – Space heating

For each in-scope space heating system in the refurbished building:

— Floor area served by heating system, the main generator, the efficiency or COP of the heat generator, the fuel used, whether the system is central or local and whether heat is distributed around the building by air.

Where district heating is in-scope for the refurbished building:

— Floor area served by district heating, the carbon emission factor for the district heating, whether the carbon factor includes distribution losses and whether heat is distributed around the building by air.

Where any of the heating systems have been improved during the refurbishment, data must also be entered for space heating systems in the existing.

The heating system data entry requirements for the existing building are the same as for the refurbished building:

— For systems that have been replaced or improved, the details must be for the system that was present in the building prior to refurbishment.

— For systems that have not been replaced or improved, the data entered must be the same as for the refurbished building.

Data entry requirements – Part 2 or Part 3 – Space cooling

For each in-scope on-site space cooling system in the refurbished building:

— Floor area served by cooling system, the main generator, the efficiency or EER of the cooling generator, whether the system is central or local and whether cooling is distributed around the building by air.

Where district cooling is in-scope for the refurbished building:

— Floor area served by district cooling, the carbon emission factor for the district cooling whether the carbon factor includes distribution losses and whether cooling is distributed around the building by air.

Where any of the cooling systems have been improved during the refurbishment, data must also be entered for space cooling systems in the existing building.

The cooling system data entry requirements for the existing building are the same as for the refurbished building:

— For systems that have been replaced or improved the details must be for the system that was present in the building prior to refurbishment.

— For systems that have not been replaced or improved the data entered must be the same as for the refurbished building.

Data entry requirements – Part 2 or Part 3 – Mechanical ventilation

Where mechanical ventilation is in-scope, enter the following data for the refurbished building:

— % of fans with variable speed drives, % of pumps with variable speed drives, specific fan power for air handling systems, whether ductwork tests for leakage have been carried out and appropriate remedial action taken, and whether the % heat recovery where fitted.

Where any of these have been improved data must also be entered for the existing building prior to refurbishment.

Data entry requirements – Part 2 or Part 3 – Hot water

For each in-scope hot water system in the refurbished building:

— Floor area served by hot water system, the main generator, the efficiency or COP of the hot water generator, the fuel used and whether the system is central or local.

Where district heating is in-scope for the refurbished building:

— Floor area served by district hot water, the carbon emission factor for the district hot water, whether the carbon factor includes distribution losses.

Where any of the hot water systems have been improved during the refurbishment, data must also be entered for hot water systems in the existing building.

The hot water system data entry requirements for the existing building are the same as for the refurbished building:

— For systems that have been replaced or improved, the details must be for the system that was present in the building prior to refurbishment.

— For systems that have not been replaced or improved, the data entered must be the same as for the refurbished building.

Data entry requirements – Part 2 or Part 3 – Lighting

Identify the lighting types present in the refurbished building and the % of lit floor area they light.

Where relevant for the lighting type enter the following additional information:

— % fitted with local controls that increase the power output as the light output reduces (LEDs and fluorescent lamps).

— % fittings with diffusers or shades (all lighting types except LEDs).

— % fitted with high frequency ballasts (fluorescent lamps).

Note: The total in-scope lit floor area must always add up to 100%.

Determine the % of in-scope lit floor area that is daylit, and the % of this space that is fitted with photoelectric controls and whether these are dimmable.

Determine the % of in-scope lit floor area that is occasionally occupied and the % of this space that is fitted with presence detection and whether the controls are auto off (manual on) or auto on (manual off).

Once all of the required data entry has been completed in the BREEAM Platform, the number of credits available, the EPRs (Energy Performance Ratios), and the number of credits awarded are calculated.

The number of credits available is determined by the proportion of regulated energy use that is included in the scope of the assessment.

The EPR is calculated for two energy performance metrics: energy use intensity (EUI), and carbon intensity (CI), and the overall EPR_{RFO} is calculated as the mean (arithmetic average) of the EPRs for the two energy performance metrics. The number of credits awarded is determined based on the EPR_{RFO} in accordance with Table 39.

M3: Standard approach for historic buildings

The standard approach for historic buildings is only applicable for assessments that include Part 1. The standard approach requires the refurbishment project to be assessed using Option 1 or Option 2, using the performance values for the components and systems are actually specified for the building.

The EPR_{RFO} increase of 0.1666667 is applied where a specialist study is carried out in accordance with criteria 2 to 6 up to a maximum EPR_{RFO} of 1.0.

M4: Alternative approach for historic buildings

This is an alternative approach to meeting criteria 2 to 6, that takes into account how historic building constraints limit the ability to improve the energy performance of the refurbished building.

For both Option 1 and Option 2, the assessment can be carried out based on the performance values for the components and systems that would have been specified for the refurbished building in the absence of local regulations relating to historic buildings.

For each component or system where the specification differs from the refurbished building the project team must identify:

a. Identify the clauses in the relevant local regulations that restrict the use of the specific component or system.

b. Justifies the selection of the alternative component that is included in for the unconstrained building.

The EPR_{RFO} score will be based on the performance of the refurbished building in the absence of the constraints imposed by local regulations imposed on historic buildings.

M5: Beyond zero net regulated carbon

The percentage of the building's total energy consumption that will be met by eligible local low and zero carbon technologies must be calculated on a net annual basis.

Regulated energy consumption is taken from the energy modelling carried out in criterion 1 and unregulated building energy consumption is based on the energy modelling or calculations used for Ene 03 (see Ene 03 Energy monitoring – M2: Estimating expected annual energy consumption on page 207).

Alternatively, where predictive energy modelling has been carried out for Ene 02 these modelling results may be used for regulated and unregulated energy.

The calculation must be carried out by, or checked by, either a suitably qualified energy modelling engineer or accredited professional, or an LZC specialist.

M5.1: Eligible local low and zero carbon technologies

Only local LZC technologies that use the following energy sources can be used for this issue:

— Wind
— Solar radiation (solar thermal and solar photovoltaic)
— Geothermal and hydrothermal energy sources
— Hydropower
— Waste heat from operational processes

Waste heat from operational processes includes manufacturing processes, high temperature oven or kiln, compressors serving process plant, microbrewery, crematorium, testing and commissioning boilers for training or manufacture, and data centres.

It does not include waste heat from IT or server rooms, which could be used as part of conventional heat recovery measures.

The following energy sources may be eligible provided additional requirements are met:

— Biomass from second generation biomass feedstock or waste sources

(For more details, see Ene 04 Low carbon design – M2.1: Eligible LZC energy generation technologies on page 215.)

To be recognised as a local LZC technology the system must be located on-site or near-site and must either:

— Have a direct (private wire) connection to the assessed building.

OR

— Where it is impractical to physically connect the assessed building, the LZC system(s) must be located on the same site and be owned and managed by the same organisation as the assessed building.

M5.2: LZC systems that serve more than one building

Where an LZC system serves or will serve more than one building, the proportion of annual energy that is attributed to the assessed building must be based on the predicted annual energy consumption for the assessed building compared to the measured or estimated annual energy consumption for all buildings connected to the LZC, minus net annual renewable energy exports to the grid.

M6: EU Taxonomy reporting

Where Option 2 is used, the EU Taxonomy report generated will automatically calculate whether the building meets the primary energy reduction required to meet the "substantial contribution" criteria in the relevant Annex 1: Climate change mitigation by achieving a 30% reduction in primary energy.

Alternatively, verified documentation confirming that the refurbished building meets with applicable requirements for major renovation projects.

Compliance notes

Ref	Terms	Description
CN1	Extensions to existing buildings	For an extension using existing building services, the modelled performance is based on the extension fabric and building services it connects to, both existing and new. The modelling does not consider: — The existing building fabric where it will be out of assessment scope or, — Existing systems that do not supply the extension.
CN2	Building contains untreated areas	Where the assessment contains a mix of treated and untreated spaces, untreated spaces may be excluded, and the performance may be based on the treated spaces only.
CN3	Energy centre or LZC technologies connected at a later stage	If a project specifies LZCs that have been proposed in the feasibility report and reduce emissions, and/or will be connected to a site-wide energy centre operational at a later stage of the phased development, after the post-construction stage review has been submitted, this issue can be assessed as follows: — In a phased development where the primary cooling system will be upgraded at a later stage than the building being assessed, a commitment to install the new cooling source must be made in the General Contract Specification. BREEAM does not specify a particular time for phasing as it is difficult to set parameters, however, as a rule building users should have to wait the least time possible before they can use the upgraded cooling source. — For the quality audit, two energy model outputs/EPCs must be produced at the final stage – one with the actual interim system installed for building control, and one for the BREEAM assessment which can include the predicted energy from the proposed energy centre. — Additionally, the legally binding general contract specification for the new cooling source must be submitted with details of the timescales proposed for the completion of the second phase of work. Where this approach is to be followed BREEAM must be consulted in each case to ensure that the arrangements are sufficiently robust to award the credits.
CN4	Parts of the building not subject to national thermal regulations	Where parts of the assessed building are not subject to national thermal regulations, these parts may be omitted from the EPR calculation.
CN5	Extensions to existing buildings and newly constructed thermal elements	Where the refurbishment project also includes a newly constructed extension with new thermal elements (see Scope section to see where this is allowable under the scope of the scheme), the performance of the baseline for new thermal elements should be based upon compliance with the appropriate local or national Building Regulations for new thermal elements. Where the new extension uses existing building services, the baseline performance of the new extension and existing building should be based upon performance of the existing common building services plant. The baseline for any new building services plant servicing the extension only should be based upon compliance with the appropriate local or national Building Regulations.

Ref	Terms	Description
CN6	No existing system or first fit-out of a building	For both Options 1 and 2 where a particular system is to be installed in the refurbished building, but no existing system is present, the following performance levels should be assumed for the existing building: First fit-out (Part 2 and/or 3): assumes values for the system that just meet those specified by current new-build regulations. Second fit-out (Part 2 and/or 3): assume values for the system that just meets current refurbishment regulation requirements. OR Where there are no refurbishment regulation requirements, a standard or average system performance value. For cooling, ventilation, and hot water systems in the existing building, the same system types as the refurbished building should be assumed.
CN7	Estimating energy demand from building systems and processes	To demonstrate compliance with the 'Exemplary level criteria', where the equipment system and process load (as relevant to project)for the existing building is similar to the energy demand for equipment and process load, post-refurbishment or fit-out, the building's equipment energy demand should be based upon metered data from the existing building. Where metered data are not available or the equipment and process load is not comparable, the predicted equipment system and process load should be modelled using CIBSE TM54 or other equivalent national best practice standards for modelling operational energy demand.
CN8	Energy exported to the grid	Any electricity from an on-site LZC energy source that is exported to the grid may be included in the calculations as if it were used within the building.
CN9	Zero carbon sources of energy – double counting	In reference to the exemplary level requirements, the project team must avoid double counting the energy from zero carbon sources. This may be particularly relevant where that source of energy generation is being counted for in terms of the assessed building's services CO_2 emissions or it will contribute to offsetting other buildings' CO_2 emissions, which are not part of this assessment.
CN10	Buildings assessed as part of a larger site	Where the building or refurbishment and fit-out zone under assessment forms part of a larger building and either a new or existing LZC installation is provided for the whole site, 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.
CN11	Energy modelling not required for Building Regulations compliance	For the purposes of demonstrating BREEAM compliance, it is still necessary to undertake energy modelling to generate the required performance data.
CN12	Energy modelling a change of use project	The energy model for the existing building in a change of use project should include the physical characteristics of the existing building but with the use class of the proposed refurbished building to enable a comparison to be made between the performances of the two buildings. Moreover, the existing building energy model needs to include the existing services as they were before the refurbishment. Where a particular system to be installed in the refurbished building is not present in the existing building, then the baseline system needs to meet the minimum requirements required to pass building regulations for it.
CN13	Energy performance assessment for part	If the assessment is only covering part of a whole building, the energy performance assessment must be representative of the part of the building being assessed. Simply taking the energy performance assessment of the whole building would not therefore

Ref	Terms	Description
	of a whole building (Option 1 only)	comply, especially if the non-assessed parts of the building were of a different use. A separate energy assessment of the part of the building is likely to be required.
CN14	LZC energy generation technologies – Local regulations and private wire arrangements	Where local regulations do not permit electricity generated by on-site renewables to be connected directly to the building, and where evidence of the relevant regulations is provided at QA, the requirement for a private wire arrangement can be waived.

Evidence

Criteria	Interim design stage	Final post-construction stage
Calculated energy performance		
1	For Option 1: Outputs generated by the approved software or calculation tool for the assessed building at the design stage that includes: — The existing and refurbished building and reference building performance data. — Name and version of the approved software used to carry out the modelling for calculating the energy performance. — Confirmation that the energy modeller who generates the EPC holds the appropriate accreditation. For Option 2: Confirmation from the project team that the energy performance of systems and components reflects the actual performance for both the existing and refurbished building along with the data sources and any assumptions used.	As per interim design stage but based on the as-built specification for the refurbished building.
Beyond zero net regulated carbon		
8	A copy of documents and calculations that demonstrate the proportion of the building's regulated energy consumption that is generated by low and zero carbon generation technologies. These should confirm: 1. The total energy generation from recognised LZC sources (kWh/year). 2. The sources of the LZC energy. 3. The annual regulated energy use for the building (kWh/year). 4. Estimates of the unregulated energy consumption from equipment and systems (kWh/year). 5. That the calculations have been provided or checked by a suitably qualified energy modelling engineer or accredited professional, or an LZC specialist.	A copy of the updated calculations which reflect the as-built specification confirming: 1. The total energy generation from recognised LZC sources (kWh/year). 2. The sources of the LZC energy. 3. The annual regulated energy use for the building (kWh/year). 4. Estimates of the unregulated energy consumption from equipment and systems (kWh/year). 5. That the calculations have been provided or checked by a suitably qualified energy modelling engineer or accredited professional, or an LZC specialist. Final construction or equivalent drawings, technical data and assessor site inspection report and photographic evidence to verify that

Criteria	Interim design stage	Final post-construction stage
	Design drawings, technical data or relevant sections of the building specification or other supporting evidence confirming the specification of the modelled LZC systems.	the specification for the modelled LZC systems matches what has been installed.
EU Taxonomy		
M6	Verified documentation that confirm that the refurbished building meets with applicable requirements for major renovation projects. Details of the regulatory requirements and the specification for the refurbished building	As design stage but based on the as-built specification for the refurbished building.

Definitions

Green lease agreement

A green lease is a contract that includes additional clauses which provide for the management and improvement of the environmental performance of a building by both owners and occupiers. To be acceptable for BREEAM a green lease agreement must cover all relevant BREEAM requirements and must be signed by both the lessor and the lessee or, where the lessee is unknown, a commitment must be provided by the client that the green lease agreement will be implemented when the building is let.

Low and zero carbon (LZC) specialist

An individual who:

— Is not professionally connected to a single LZC technology or manufacturer.

AND, either:

— Has carried out LZC assessments for at least 3 years.

OR

— Has a recognised qualification for undertaking assessments, designs, and installations of LZC solution in the building sector.

National Calculation Method (NCM)

National or regional calculation tools that are used to calculate compliance against minimum energy performance standards set by building regulations.

Nearly zero energy building (nZEB)

Nearly-zero energy building (nZEB) means a building that has a very high energy performance, while the nearly zero or very low amount of energy required should be covered to a very significant extent by energy from renewable sources, including energy from renewable sources produced on-site or nearby.

Note: Since 2020, the Energy Performance of Buildings Directive (EPBD) has required that all new buildings in the EU have to be nearly-zero energy buildings.

See also Zero emission building (ZEB).

Operational energy

Energy consumption for all end uses present when the building is operational except for industrial scale process loads. Operational energy includes both regulated and unregulated energy consumption.

Reference building

A hypothetical building that has the same size, shape, orientation, internal layout, fabric as the refurbished building but with fabric and building service specifications that are typical for that building type.

The reference building uses that same standard occupancy assumptions for that building.

Regulated energy

Building energy consumption resulting from the specification of fixed building services and fittings, including space cooling, hot water, ventilation, fans, pumps, and lighting that are controlled through the applicable building regulations.

See also Unregulated energy and Operational energy.

Suitably qualified energy modelling engineer or accredited professional

An individual who has:

- A minimum of 3 years relevant experience in building energy modelling within the last 5 years.
- A recognised qualification or chartership such as a building services engineer or building energy modelling engineer.
- Broad expertise to cover all required technical aspects, guaranteeing that the data entry in the energy model is appropriate and the results reflect the actual performance of the building.

Where the modelling is being carried out a team of modellers their combined experience must meet the individual requirements.

Suitably qualified heritage conservation specialist

A person with at least 3 year's relevant experience in heritage conservation within the last 5 years and a recognised qualification in building conservation with a nationally recognised accreditation body or institute. The individual should have a working knowledge of techniques for the restoration and conservation of heritage buildings. This includes knowledge of the materials and techniques that can be used to improve energy efficiency in historic buildings, while identifying and managing any risks that may damage the historic character and welfare of the building.

Unregulated energy

Building energy consumption resulting from building services and fittings that are not addressed by applicable building regulations.

See also Regulated energy and Operational energy.

Zero emission building (ZEB)

A zero-emission building has no on-site carbon emissions from fossil fuels and a very high energy performance.

Note: The recast Energy Performance of Buildings Directive (EPBD) will require all new residential and non-residential buildings owned by public bodies to be zero-emission buildings from 1 January 2028. This requirement will also apply to all other new buildings from the 1 January 2030.

See also Nearly zero energy building (nZEB).

Additional information

None.

Ene 02 Prediction of operational energy and carbon

(all buildings)

Aim

This issue encourages and rewards the use of detailed energy modelling to explore the impact of occupancy and use patterns, encourage design choices that mitigate risks relating to underperformance in use and generate a realistic prediction of operational energy consumption and carbon emissions in use to facilitate comparison with benchmarks.

Overview

Assessment type	Credits available	Minimum standards	Applicable assessment criteria
Part 1: Fabric and structure	0	None	Not applicable
Part 2: Core services	up to 12 + 4 exemplary	Excellent, Outstanding	All
Part 3: Local services	up to 12 + 4 exemplary	Excellent, Outstanding	All
Part 4: Interior design	0	None	Not applicable

Assessment type specific notes

Ref	Assessment type specific note
-	None

Building type specific notes

Ref	Building type specific note
-	None

Issue specific notes

Ref	Issue specific note
3.0	All credits for this issue can be filtered out if either: — Total occupied GIA of the assessment zone for the refurbishment project is < 1000 m². — The refurbishment is not expected to have a significant impact on the operational energy performance. The minimum standard for "No fossil fuels in-scope" (criterion 19) still applies.

Assessment criteria

Up to five credits – Prediction of operational energy consumption process

One credit – Energy strategy

1 Define an energy strategy for the refurbished building at the concept design stage that describes qualitatively how the operational energy and carbon performance of the building will be minimised (see M2.1).

Up to three credits – Prediction of operational energy consumption

2 Estimate unregulated energy uses and occupancy patterns for the building (see M2.2.1).

3 Identify all planned changes to building fabric, building services and other energy using systems and that are likely to affect the buildings operational energy consumption.

4 Based on the scope of refurbishment, select the route for predicting operational energy consumption (see Table 42 below).

Table 42: Routes for the prediction of operational energy consumption

Route	Scope of refurbishment
Route 1: Detailed energy modelling conducted from the design stage (see M2.2.2)	Mandatory for refurbishment projects that include any of the following: • Assessments containing Part 1. • Where HVAC building servicing systems are replaced. • Where the refurbished building is undergoing a change of use.
Route 2: Use of metered data and simple energy modelling (see M2.2.3)	Optional for refurbishment projects for which Route 1 is not mandatory and for which: • Metered data broken down annually by end-use for the existing building is available.

5 Predict annual operational energy consumption in use by fuel type for the refurbished building based on the methodology specified for the route selected (see M2.2).

One credit – Risk assessment and mitigation

6 Achieve the prediction of operational energy consumption credits (criteria 2–5).

7 Highlight any significant design, technical, and process risks that might prevent the building achieving its energy performance target and indicate how these risks will be mitigated throughout the construction and commissioning process (see M2.3).

Up to seven credits – Predicted operational energy performance score

8 Achieve the prediction of operational energy consumption credits (criteria 2–5).

9 Credits are awarded based on the Operational Energy Performance score for Refurbishment (OEP_{RFO}) as shown in Table 43 below.

Table 43: Credits awarded according to OEP_{RFO}

Operational energy performance score, OEP_{RFO}	Number of credits	Minimum standard*
> 0	1	-
≥ 0.1429	2	-
≥ 0.2857	3	Excellent [note 1]
≥ 0.4286	4	
≥ 0.5714	5	Outstanding [note 2] AND No fossil fuels on-site (criterion 19)
≥ 0.7143	6	
≥ 0.8571	7	

Notes to Table 43

1. Alternatively meet the minimum EPR_{RFO} score specified for Excellent in Ene 01.

2. Alternatively meet the minimum EPR_{RFO} score specified for Outstanding in Ene 01.

One exemplary credit – Disclosing an in-use energy performance target

10 Achieve the prediction of operational energy consumption credits (criteria 2–5).

11 An in-use energy performance target has been disclosed to stakeholders and been made publicly available prior to practical completion (see M4).

One exemplary credit – Third-party validation of predictive energy modelling – Route 1

12 Achieve the prediction of operational energy consumption credits (criteria 2–5).

13 The predicted energy consumption modelling results have undergone third-party validation (see M5).

One exemplary credit – Preparing for in-use measurement of energy consumption

14 Achieve the prediction of operational energy consumption credits (criteria 2–5).

15 Achieve maximum available credits in Ene 03 Energy monitoring.

16 The energy modelling outputs include a breakdown of the energy use by sub-meter that aligns with the energy monitoring strategy for the building.

One exemplary credit – Commitment to measure energy consumption in-use

17 Achieve the prediction of operational energy consumption credits (criteria 2–5).

18 The client or building occupier commits funds to pay for the in-use energy consumption to be measured by a suitably qualified energy assessor once the building reaches the occupancy threshold (see M6).

Minimum standard – No fossil fuel use by in-scope building services and equipment

19 No fossil fuels will be used by in-scope building services and equipment:

19.a For Part 2 assessments this means that no core services or equipment in common areas will use fossil fuels in operation.

19.b For Part 3 assessments this means no local building services or equipment outside of common areas will use fossil fuel in operation (see M7).

Methodology

M1: Scope

This issue applies at the building level even when the assessment zone for the refurbishment project only considers part of a building.

M2: Predictive energy modelling

M2.1: Energy strategy – Route 1 only

An energy strategy for the refurbished building must be generated at the concept design stage. This should outline the fabric performance specification and the energy servicing strategies and describe qualitatively how alterations to these will contribute to reducing operational energy consumption in use. The energy strategy should also demonstrate that the use of local low and zero carbon (LZC) technologies have been considered and specified, where feasible.

The energy strategy may be supported by early-stage design models, tools and calculation. It should indicate any energy related performance targets that are set for the building at the concept design stage.

M2.2: Prediction of operational energy consumption

M2.2.1: Estimating unregulated energy loads and occupancy patterns

Identify which of the following energy end uses will be present in the building:

- Energy use for lighting not covered by building regulations.
- Energy use for lifts and escalators.
- Energy use for small power.

- Energy use for catering.
- Energy use for server rooms.
- Energy use for domestic hot water.
- Energy use for any other types of unregulated plant and equipment – e.g., commercial refrigeration, medical equipment etc.
- Energy use for industrial process load.

For each of the end uses included in the scope of the refurbishment use profiles must be determined. These may be either estimated or based on measured energy consumption for the existing building. For estimated use profiles this should be based on project specific occupancy and usage patterns. For measured energy uses these should be determined at the lowest level disaggregation permitted by sub metering.

For end uses where energy consumption is estimated, or where there will be a change of use the anticipated operating hours should be requested from the intended occupier, for example through structured interview. This information together with the design and control regimes for proposed systems (e.g. optimum start controls, night set back and night purge) should be used to estimate the hours of operation for the plant and equipment.

Where no intended occupier has been identified, the assumptions should be based on in use benchmarks or unregulated energy loads and occupancy patterns for similar buildings. Assuming the standard occupancy patterns used for Ene 01 is not sufficient for this issue.

M2.2.2: Route 1 methodology

M2.2.2.1: Detailed energy modelling

Where route 1 is being undertaken, assessors must construct a detailed energy model at the design stage and undertake sensitivity analysis and scenario modelling (see M2.2.2.2) to explore the impact of key parameters and assumptions on energy consumption.

Predictive energy modelling must be carried out by a suitably qualified energy modelling engineer or accredited professional. They must use BREEAM approved dynamic simulation (DSM) with advanced capabilities for HVAC systems and controls to explore how the building will perform under different operating conditions. DSM should use a detailed HVAC systems approach where applicable (see GN53).

Alternatively, where the building meets the following criteria an alternative modelling approach may be used:

- The building will be controlled by a single occupier.
- Is serviced by simple building systems with no complex controls.
- The building does not rely on thermal mass.
- The building does not have complex geometry.

Where an alternative modelling approach is used a suitably qualified energy modelling engineer or accredited professional must confirm that the alternative approach selected will be able to model the building performance with sufficient accuracy.

In all cases the predictive energy modelling must predict the operational energy consumption of the building over the course of a year based on the expected unregulated energy loads and expected occupancy patterns for the building.

Where the scope of the assessment doesn't include Part 1, it may be more accurate to use metered data from the existing building as the primary source on which the prediction of operational energy consumption is based, with detailed energy modelling being used in a supplementary manner.

Within this approach, metered data may be used for all regulated building services and non-regulated loads that are not replaced or refurbished in line with the Route 2 methodology outlined in M2.2.3. For all building elements being replaced or refurbished, the impact on total operational energy consumption must be determined via detailed energy modelling in line with the general Route 1 methodology.

M2.2.2.2: Sensitivity analysis and scenario modelling

Sensitivity analysis should be undertaken to explore the effect of assumptions relating to the following input variables:

- The efficiency of major energy consuming components.
- Alternative system configurations and control strategies.

- Occupancy density and hours of use.
- Management and occupant behaviour.
- Current and future weather scenarios.

It is not necessary to consider all input variables, but the sensitivity analysis should focus on those that are expected to have the most significant impact on energy consumption.

The sensitivity analysis should be used to inform the development of scenarios that reflect the likely energy performance range for the building. The scenarios must include:

- A central case scenario which represents the most reasonable assumptions about occupancy, fabric and building system efficiencies and control strategies.
- A high-end scenario based on uncertainties relating to key input parameters which result in higher energy consumption.
- A low-end scenario based on uncertainties relating to key input parameters which result in lower energy consumption.

M2.2.2.3: Predicting annual operational energy

The predicted annual operational energy consumption for the building must be based on the scenario modelling results and be higher than that for central case scenario.

How high the predicted energy performance should be set above the central case scenario should be informed by the range of the scenario modelling results, the extent to which risks of underperforming in use have been mitigated, and previous experience with other similar projects.

An uncertainty margin of 20% over the central case scenario should be used as a default unless a lower or higher modelling margin is recommended by a suitably qualified energy modeller in which case the margin used must be justified in the energy modelling report (see M2.2.4).

M2.2.3: Route 2 methodology

M2.2.3.1: Metered data and simple energy modelling

Route 2 offers an alternative route to detailed energy modelling for projects where the scope of change to operational energy consumption through refurbishment can be estimated based on metered energy consumption data.

The primary data source when undertaking this route is metered data from the existing building. At a minimum, a year's worth of metered data broken down by end-use and energy source is required to complete this route. Energy consumption must be sub metered at a level that corresponds with the scope of the refurbishment. For Part 2, this would cover core building services and energy-using components in common areas and for Part 3, energy using components in tenanted or functional areas. If this data is not available, then route 2 cannot be completed and route 1 must be selected.

End-uses being replaced and introduced to the refurbished building should be identified. The impact of these changes on the metered data should then be quantified via justified assumptions or simplified energy modelling approaches. E.g., be based on differences in typical benchmarks, simplified engineering calculations, data from similar projects, manufacturer's data, or on any other reasonable assumptions.

These calculations may be carried out by a member of the project team with previous experience or by a suitably qualified energy modeller.

The annual operational energy consumption of the refurbished building is calculated from metered energy consumption for existing building, plus the estimated energy consumption for all newly installed or refurbished systems, components and equipment, minus the energy consumption for all existing systems, components and equipment that are replaced or refurbished.

$$OEC_{refurb} = OEC_{existing\ metered} + \sum \text{annual energy consumption all new/refurbished systems} - \sum \text{energy consumption all existing systems replaced}$$

Where:

OEC_{refurb} = Operational energy consumption of the refurbished building

$OEC_{existing\ metered}$ = Operational energy consumption of the existing building based on metered data

This determines the annual operational energy consumption for the refurbished building (see M2.2.4).

An uncertainty margin should then be applied to the estimated operational energy consumption for the refurbished building. This should be based on the proportion of energy consumption that has been estimated based on energy using systems and components that have been replaced, the sources of information used to determine the energy use for replaced and new systems, components and equipment installed plus the extent to which risks of underperforming in use have been mitigated.

M2.2.4: Reporting modelling results

The figure produced for the prediction of operational energy consumption must cover the following:

- Sources of data and information for the assumptions and inputs about occupancy patterns and unregulated energy loads.
- Key assumptions that have been made and the risks of these being wrong.
- The levels of uncertainty that can be ascribed to the key assumptions and inputs.
- The ranges of possible outcomes, and sensitivity of the variables.

It should also identify variables that are under the control of the designers and those that will be controlled by the occupants.

The modelling report must also include predicted of annual energy consumption for all energy sources used within the building. As a minimum these must be grouped to match the energy metering strategy for refurbished building.

Guidance Note 53 (GN53) provides more details on reporting energy modelling results.

M2.3: Risk assessment and mitigation

The risk assessment should consider situations where the design assumptions and operational situation could have a significant negative impact on energy consumption in use.

Risks to be considered (where relevant) include:

- Product specification and the management of value engineering decisions.
- Construction quality.
- System installation considerations, particularly for complex or novel systems.
- Appropriate commissioning of servicing systems.
- Ensuring that end users understand how to operate the building as intended.

Options for mitigating these risks include:

- Product specification and the management of value engineering decisions – Contractual requirements relating to changes to the design specification.
- Construction quality – Achieving the Testing and inspecting building fabric credit in Man 04.
- System installation considerations, particularly for complex or novel systems – The use of experienced installers and contractors.
- Appropriate commissioning of servicing systems – Achieving the Commissioning building services credit in Man 04 and/or the In-use commissioning credit in Man 05.
- Ensuring that end users understand how to operate the building as intended – Achieving the Handover credit in Man 04.

Note that alternative mitigation measures may be used.

Where it can be demonstrated that the expected benefits of implementing a mitigation measure is minimal the measure does not have to be implemented.

M3: Predicted operational energy score

The operational energy performance metrics are then compared to BREEAM benchmark values for energy use intensity (EUI) in kWh/m² and carbon intensity (CI) in $kgCO_2e/m^2$ for the relevant building type.

M3.1: Calculating the predicted operational energy score

The annual predicted energy consumption for all operational energy uses in the building, except for industrial process loads, must be entered into BREEAM Platform for each of the following energy sources:

- Grid supply electricity
- Natural gas
- Burning oil/kerosene
- Gas oil
- Fuel oil
- Diesel
- Petrol
- LPG
- Other petroleum gas
- Coal
- Biodiesels
- Landfill gas
- Other biogas
- Wood
- Renewable heat source or renewable cooling source
- District heating
- District cooling
- Renewable electricity generated on site
- Renewable electricity generated on site and exported from the building

For buildings with district heating or cooling the carbon emission factor for the system must also be entered.

The energy use intensity (EUI) is calculated in the BREEAM Platform based on the energy consumption data entered and the floor area of the building. The EUI includes all energy sources used by the building, including renewable energy generated onsite. Net annual exports of renewable energy that are exported e.g., renewable electricity generated onsite and exported to the grid, may be excluded.

The carbon intensity (CI) is calculated in the BREEAM Platform using the appropriate carbon emission factors for each energy source and the floor area of the building.

An Operational Energy Performance score is determined relative the building benchmarks for both EUI (OEP_{EUI}) and CI (OEP_{CI}) for the building.

To account for different building use areas within a single building up to 5 building use types and floor areas may be entered into the BREEAM Platform. This is used to calculate a building specific benchmark within the BREEAM Platform.

The overall Operational Energy Performance score (OEP_{RF}) is calculated as follows:

$$OEP_{RFO} = 0.5 \times OEP_{EUI} + 0.5 \times OEP_{CI}$$

M3.2: Calculating the carbon emission factor for district heating or cooling systems

The carbon emissions factor for district heating or cooling ($EF_{DH/DC}$) must be calculated on an annual basis as follows:

$$EF_{DH/DC} = (kgCO_2e_{generation} + kgCO_2e_{distribution}) / kWh_{heat/cooling}$$

Where:

- $kgCO_2e_{generation}$ = Annual carbon emissions from all energy sources used to generate heat or cooling. This is calculated from the energy used to the generate all heat or cooling multiplied by the respective emissions factors.
- $kgCO_2e_{distribution}$ = Annual carbon emissions from all energy sources used to distribute heat or cooling to final users. This is calculated from the energy used to distribute all heat or cooling multiplied by the respective emission factors.
- $kWh_{heat/cooling}$ = Annual kWh of heat or cooling delivered to all final users.

For existing systems this should be based on the most recent 12 month of operation and for new plant based on engineering calculations.

M3.3: Carbon emission factors for electricity and heat from combined heat and power

Electricity consumed by the building that is generated from combined heat and power is assigned the grid supply emission factor and should be entered into the BREEAM Platform as such.

The carbon emission factor for heating from a combined heat and power plant ($EF_{CHPheat}$) must be calculated on an annual basis as follows:

$$EF_{CHPheat} = ((kgCO_2e_{generation} + kgCO_2e_{distribution}) - (kWh_{electricity} \times EF_{electricity})) / kWh_{CHPheat}$$

Where:

- $kgCO_2e_{generation}$ = Annual carbon emissions from all energy sources used to generate heat and power calculated from the sum of energy used multiplied by their respective emissions factors.
- $kgCO_2e_{distribution}$ = Annual carbon emissions from all energy used to distribute heating to final users calculated from the energy inputs used to distribute the heat multiplied by their respective emission factors.
- $kWh_{electricity}$ = Annual kWh of electricity delivered to final users.
- $kWh_{CHPheat}$ = Annual heat delivered to all final users.
- $EF_{electricity}$ = Emission factor for grid supply electricity ($kgCO_2e/kWh$).

Where the calculation results in a negative emission factor an emission factor of zero must be entered into the BREEAM Platform.

For existing systems this should be based on the most recent 12 months of operation. For new plant this should be based on engineering calculations.

M4: Disclosing an in-use energy performance target

The energy target should be expressed as an annual energy intensity normalised by floor area.

The scope of energy uses included in the target must be explicitly stated, for example, whole building, core building services and common areas only, or tenanted areas only.

Where a target is set in units other than delivered energy (for example, carbon emissions or primary energy), factors to convert these to delivered energy must be provided. In all cases the floor metric must be defined (for example, GIA or NIA).

This information must be made available to building stakeholders (for example, prospective owners and occupiers of the building) and be accessible to members of the public.

M5: Third-party validation of energy prediction model – Route 1 only

The energy prediction model and the predicted operational energy values should be validated by a suitably qualified energy modelling engineer or accredited professional who is not involved with the project team or the client.

A validation report must be produced that presents an unbiased analysis of the energy model carried out and recommendations for improving the modelling. The recommendations for improving the modelling must either be implemented, or justification for not implementing recommendations provided.

M6: Commitment to measure in-use energy consumption

The funding for in-use energy consumption measurement must be sufficient to cover monitoring of energy consumption for the first 12 months of normal occupancy (≥ 80% full occupancy) for all relevant end uses and compare these to the predicted energy consumption and any energy targets set for the building.

This could be demonstrated by undertaking a BREEAM In-Use assessment of operational energy.

Where the building will be sold or let a green lease agreement must include clauses that guarantee access to energy consumption data once the building is occupied.

M7: No fossil fuel use by in-scope building services and equipment

The scope of fossil fuel use by in-scope building services and equipment includes all fossil fuel use by the building except for:

- Industrial scale process loads.
- Emergency and life safety systems such as those for firefighting, evacuation, or back-up power for safety-critical systems and equipment, or within healthcare settings.
- Essential back-up systems serving buildings with functions where it is essential to maintain their continuous use, particularly in response to a disaster, for example hospitals, fire stations, police stations and emergency vehicle garages.

— Essential back-up systems serving data centres.

— Testing purposes within laboratory settings.

Compliance notes

None.

Evidence

Criteria	Interim design stage	Final post-construction stage
Energy strategy		
1	Energy strategy statement for the building, detailing all the requirements within M2.1.	No further actions required post-construction; no additional evidence is required other than that listed for the design stage.
Prediction of operational energy consumption		
2–5	*For Route 1:* Energy modelling report which includes: — Estimated unregulated energy uses and occupancy patterns used within the detailed energy modelling. — Sensitivity analysis and scenario modelling. — The predicted annual operational energy consumption in use by fuel type based on the results. Confirmation of the energy modeller's qualifications and experience. *For Route 2:* A report containing: — Data showing the breakdown of energy use by sub-meter over a year's operation in the existing building. — A quantification of changes to regulated and unregulated energy uses as a result of the refurbishment and the justification for these numbers. — The predicted annual operational energy consumption in use by fuel type based on the results.	*For Route 1:* Updated energy modelling report to account for any changes to the building specification, where required. Confirmation of the energy modeller's qualifications and experience. *For Route 2:* Updated report to account for any changes to the building specification, where required.
Risk assessment and mitigation		
7	Energy modelling report or other document that includes a risk assessment and details of mitigation measures, in line with M2.3.	Same evidence as the design stage but with confirmation of mitigation measures that have already been implemented.
Predicted operational energy performance score		
9	Results of the predictive energy modelling confirming the predicted operational energy consumption for all energy uses. Where appropriate, calculations showing how the carbon emission factor for district heating and district cooling have been determined.	Updated energy modelling report to account for any changes to the building specification, where required. Where appropriate, calculations showing how the carbon emission factor for district heating and district cooling have been determined.
Disclosing an in-use energy performance target		
11	Contract documentation or a letter of commitment from the client or developer to	Weblink or other documentation that indicates where the performance target can be viewed

Criteria	Interim design stage	Final post-construction stage
	disclose the in-use energy performance target to stakeholders and make it publicly available prior to practical completion.	by stakeholders and the general public.
Third-party validation of predictive energy modelling		
13	Energy model validation report. Evidence to show this was completed by a suitably qualified third party. Energy modelling report or other documentation indicating improvements made to the model post validation.	Energy modelling report or other documentation indicating improvements made to the model post construction.
Preparing for in-use measurement of energy consumption		
16	Energy modelling report showing a breakdown of results of the energy use by sub-meter.	Updated energy modelling report to account for any changes to the building specification, where required.
Commitment to measure energy consumption in-use		
18	Commitment from the client that funds will be available to pay for the in-use energy consumption to be measured by a suitably qualified energy assessor.	Confirmation from the client that funds have been committed and how the requirements will be met. Identify the assessor or assessment scheme that will be used. A signed contract for the scope of work with the person or organisation who will be carrying out the assessment. Evidence to support that the appointed person meets the definition of a suitably qualified energy assessor. Where applicable, clauses in the green lease agreement that guarantee access to in-use energy consumption data.
No fossil fuel use by in-scope building services and equipment		
19	Design drawings, relevant section of the building specification, contract clauses or letter of confirmation from the project team which demonstrates that no fossil fuels will be used by in-scope building services and equipment.	Final construction drawings or equivalent, assessor site inspection and photographic evidence or other supporting documentation to show that no fossil fuels are being used by in-scope building services and equipment.

Definitions

Combined heat and power

The concurrent production of electricity or mechanical power and useful thermal energy (heating and/or cooling) from a single source of energy.

Green lease

A green lease is a contract that includes additional clauses which provide for the management and improvement of the environmental performance of a building by both owners and occupiers.

To be acceptable for BREEAM a green lease agreement must cover all relevant BREEAM requirements and must be signed by both the lessor and the lessee or, a where the lessee is unknown, a commitment must be provided by the client that the green lease agreement will be implemented when the building is occupied.

Industrial scale process loads

The energy used during manufacturing, production, waste treatment or other industrial processes (for example, chemical, physical, electrical, or mechanical processes during the production or manufacture of products).

The energy may be used for activities such as heating, cooling, mechanical work, chemical reactions, and other operations essential for the transformation of raw materials into finished products or goods.

Local LZC technologies

To be recognised as a local LZC technology the system must be located on-site or near-site and must either:

— Have a direct (private wire) connection to the assessed building.

OR

— Where it is impractical to physically connect the assessed building, the LZC system(s) must be located on the same site and be owned and managed by the same organisation as the assessed building.

Operational energy

Energy consumption for all end uses present when the building is operational except for industrial scale process loads. Operational energy includes both regulated and unregulated energy consumption.

Regulated energy

Building energy consumption resulting from the specification of fixed building services and fittings, including space heating and cooling, hot water, ventilation, fans, pumps, and lighting that are controlled through the applicable building regulations.

Suitably qualified energy assessor

An individual who:

— Has experience of carrying out energy audits or in-use energy performance assessments in accordance with legislation or voluntary measurement and reporting standards.

OR

— Has accreditation from a suitable and recognised scheme certifying that they are qualified to assess the energy efficiency of buildings.

Suitably qualified energy modelling engineer or accredited professional

An individual who has:

1. A minimum of 3 years relevant experience in building energy modelling within the last 5 years.
2. A recognised qualification or chartership such as a building services engineer or building energy modelling engineer.
3. Broad expertise to cover all required technical aspects, guaranteeing that the data entry in the energy model is appropriate and the results reflect the actual performance of the building.

Where the modelling is being carried out a team of modellers their combined experience must meet the individual requirements.

OR

For DSM modelling:

— Is a certified ASHRAE Building Energy Modelling Professional or equivalent.

For PHPP modelling:

— Is a Passivhaus Designer or Consultant.

Third party

"A person or body that is recognised as being independent of the parties involved, as concerns the issue in question" (BS EN 15804:2012+A1:2013).

The suitably qualified energy modelling engineer or accredited professional third-party verifier must be independent of the energy modeller who created the model and demonstrate impartiality (for general principles, see ISO 17029). To qualify as a third party, the verifier must belong to an organisation not involved in the project and must not provide advice to the project, as this could compromise their impartiality during verification.

Unregulated energy

Building energy consumption resulting from building services and fittings that are not addressed by applicable building regulations.

Additional information

None.

Ene 03 Energy monitoring

(all buildings)

Aim

To encourage installation of energy sub-metering to monitor operational energy consumption. To enable predicted and actual energy performance to be compared and to inform ongoing energy management.

Overview

Assessment type	Credits available	Minimum standards	Applicable assessment criteria
Part 1: Fabric and structure	0	None	Not applicable
Part 2: Core services	up to 2	Very Good	All (see ref 2.0 and 2.1)
Part 3: Local services	up to 2	Very Good	All (see ref 2.0 and 2.1)
Part 4: Interior design	0	None	Not applicable

Assessment type specific notes

Ref	Assessment type specific note
-	None

Building type specific notes

Ref	Building type specific note
2.0	**Education – Preschool** For Education – Preschool buildings, the energy monitoring for different occupiers and functional areas credit is filtered out.
2.1	**Residential institution (long term stay)** For Residential institution (long term stay) buildings, the energy monitoring for different occupiers and functional areas credit is filtered out.

Issue specific notes

Ref	Issue specific note
3.0	**Energy monitoring for separately occupied areas and different functional areas** Where there are no separately occupied areas or different functional areas (criterion 6) this credit will be filtered out.
3.1	**No relevant energy sources** Where no relevant energy sources are present in the building this issue is filtered out.

Assessment criteria

One credit – Energy monitoring by end-use

1 Identify the energy sources that are used by the building and estimate the annual energy consumption for the following (see M2):

1.a Grid supply electricity

1.b Grid supply gas

1.c District heating

1.d District cooling

1.e Renewable electricity generated on-site.

2 Energy monitoring is installed that allows ≥ 90% of the estimated annual energy consumption for each energy source to be assigned to an end-use category (see M3).

3 Renewable electricity generated on-site and exported from the building must be separately monitored.

4 There is an energy metering system appropriate for the size of the building:

4.a For buildings with a gross internal area ≥ 1000 m², the energy meters are connected to an energy monitoring and management system.

4.b For buildings with a gross internal area < 1000 m², the energy meters are either:

4.b.i Connected to an appropriate energy monitoring and management system.

OR

4.b.ii Are accessible meters with pulsed outputs or other open protocol communication outputs.

5 Those responsible for monitoring the building's energy consumption can clearly identify the end-use category covered by each meter.

One credit – Energy monitoring for different occupiers and functional areas

6 Energy monitoring is installed that allows energy consumption to be assigned to separately tenanted or occupied areas and to relevant functional areas within the building (see M4).

7 There is an energy metering system appropriate for the size of the building:

7.a For buildings with a gross internal area ≥ 1000 m², the energy meters must be connected to an energy monitoring and management system.

7.b For buildings with a gross internal area < 1000 m², the energy meters are either:

7.b.i Connected to an appropriate energy monitoring and management system.

OR

7.b.ii Are accessible meters with pulsed outputs or other open protocol communication outputs.

8 Those responsible for monitoring the building's energy consumption can clearly identify the functional or occupier area covered by each meter.

Methodology

M1: Scope of assessment

The end uses to include in the scope of the assessment are dependent on the Parts being assessed.

For projects that are being assessed for Part 2 and Part 3, all energy-using systems and equipment within the assessment zone must be included.

For Part 3 only assessments, all energy-using systems and equipment in common areas and services provided to other areas within the assessment zone must be included.

For Part 2 only assessments, all equipment and local systems serving separately tenanted or occupied areas within the assessment zone must be included.

In all cases, the assessment may be applied at a wider assessment scope up to the whole building level.

M2: Estimating expected annual energy consumption

Identify all energy sources that are to be included within the scope of assessment, including renewable electricity generation that is used within the building.

Estimate the expected annual energy operational energy consumption for end uses included in the scope of the assessment for each of the following energy sources:

- Grid supply electricity
- Grid supply gas
- District heating
- District cooling
- Renewable electricity generated on-site

Where annual operational energy consumption has been determined in accordance with Ene 02 predictive energy modelling methodology, these results should be used, otherwise, energy consumption estimates may be derived from simple energy modelling results (including NCM calculations), benchmarks, data for similar projects, or simple engineering calculations.

An alternative method may be used to determine the building's energy consumption where a suitably qualified energy professional confirms that the methodology is appropriate.

Where metering permits, the energy consumption may be based on annual energy consumption adjusted to take account of post refurbishment energy consumption changes.

M3: Monitoring energy consumption by end-use

Identify the end use that are collectively expected to account for 90% of the annual operational energy consumption within the assessment scope (See M1).

As a minimum the following end-uses must be considered, where present:

- Space heating and cooling generators
- Hot water generator
- Fans for mechanical ventilation, space heating or cooling
- Pumps for distribution heating or cooling
- Commercial scale refrigeration or cold storage
- Internal lighting
- External lighting
- Controls and telecommunications
- IT equipment and small plug-in loads
- Internal transport (lifts and escalators)

Devise an energy metering strategy that ensures that end uses are separately monitored where it is technically feasible and cost effective to do so.

For this issue, metering is considered cost effective where the cost of installing a sub-meter is lower than the energy cost savings arising from improved energy management over the expected lifetime of the building.

Where direct metering is not feasible, monitoring may be achieved by one of the following means:

- Measuring the run-hours of a piece of equipment that operates at a constant known load.
- Based on temperature differences for metered hot water consumption.

M3.1: Combining end use categories for sub-metering

Some common examples of end uses that are often metered together include:

- **Lighting and small power** – lighting and small power can be combined where it is not cost effective to sub-meter lighting and small power separately.
- **Heating and hot water** – space heating and domestic hot water may be combined with a single heat or gas meter where a common plant provides both end-uses (e.g. a boiler) and it is impractical to meter the end uses separately.

- **Heating and cooling** – space heating and space cooling may be combined when both services are provided by a single piece of equipment or plant (e.g. a reversible heat pump or district heating).
- **Modular heating or cooling systems** – modular systems can be monitored as a whole.
- **Multiple fans** – multiple fans may be monitored together (for example, where there are multiple fans within an air handling unit (AHU).

Note that for tenanted office, industrial, or retail units with a GIA of < 250 m² that are separately monitored it is acceptable to sub-meter:

1. Space heating
2. Electricity
3. Hot water (where feasible)

M3.2: Documenting the metering strategy

In all cases a metering schedule or metering strategy document must be produced that sets out for each energy source:

1. Main end uses
2. Monitored areas
3. Estimated energy consumption
4. Metering method used
5. Meter number or code
6. Physical location of the meter

For a worked example, see General Information Leaflet 65: Metering energy use in new non-domestic buildings(71). This document also includes an example of a metering schedule and a metering strategy.

M4: Monitoring energy consumption for different occupants and functional areas

Identify units or areas in the scope of the assessment with different tenants or occupiers, OR, where the building is designed for a single occupancy, different functional areas.

Devise an energy metering strategy that ensures that different occupants or functional areas are separately monitored where it is technically feasible and cost effective to do so.

For this issue metering is considered cost effective where the cost of installing a sub-meter is lower than the energy cost savings arising from improved energy management over the expected lifetime of the building.

Where the scope of the assessment is Part 3 and this only includes a single tenant or functional area this credit can be filtered out.

M4.1: Different tenants or occupants

For buildings with different tenants or occupants, meters must be installed on the energy supply to each separate tenanted unit or area.

For buildings with a gross internal floor area of ≥ 500 m², with a single tenant or occupant, and with only one function, the area must be split up into smaller, discrete, logical areas that provides useful information to building management about energy use, e.g. by floor plate.

M4.2: Different functional areas

For this issue, a different functional area is defined as an area where there is expected to be significantly different energy loads, controls, occupation, or usage patterns.

Meters must be installed on the energy supply to each different functional area ≥ 100 m².

Functional areas that typically require submetering are listed in Table 44 on the next page, but it is up to the project team to determine the relevant functional areas that require monitoring.

Table 44: Examples of relevant functional areas for different building types[1]

Building type	Relevant functional areas
Residential institution (long term stay)	1. Residential unit 2. Common areas
Office	1. Office areas, typically by floor (or similar beneficial grouping) 2. Common areas 3. Catering
Retail	1. Sales area 2. Storage and warehouse 3. Cold storage 4. Offices 5. Catering 6. Tenant units
Industrial	1. Office areas 2. Operational area 3. Ancillary areas (e.g. canteens)
Hotels	1. Office areas 2. Catering (e.g. kitchen, restaurant) 3. Conference suites 4. Swimming pool or leisure facilities 5. Bedrooms, by floor or core (or similar beneficial grouping)
Education	1. Kitchens (excluding small staff kitchens and food technology rooms) 2. Workshops 3. Classrooms 4. Lecture halls 5. Conference rooms 6. Swimming pools 7. Sports halls 8. Process areas 9. Laboratories 10. IT server rooms Note: Individual sub-metering of standard classrooms or seminar rooms is not required.
Hospitals and other healthcare facilities	1. Medical physics facilities 2. Rehabilitation when including hydrotherapy pools 3. Central sterile supplies departments (or equivalent) 4. Areas with specialist equipment (e.g. commercial-scale kitchens and laundries) 5. IT server rooms 6. Pharmacy departments 7. Laboratories 8. Tenanted areas (e.g. catering, retail, laundry) Note: Sub-meters can be provided per floor plate in small healthcare buildings (gross internal floor area < 1000 m²) that have no functional areas with a high energy load.
Other	Other types of single occupancy buildings can use the functional areas above as a guide to the type of areas that may require sub-metering.

Compliance notes

Ref	Terms	Description
CN1	Buildings situated on campus developments	Buildings situated on campus developments must be monitored using either an appropriate energy monitoring and management system or another automated control system, e.g. outstations linked to a central computer.

1 This table lists common functional areas by building type. The lists are not exhaustive and where other areas exist with high or variable energy loads, these should also be considered as part of the overall metering strategy.

Ref	Terms	Description
		The criteria only apply to the assessed building. Where energy services are supplied from an existing building on the campus, they must be metered at the entry points to the assessed building, e.g. hot water, chilled water, gas and electricity. Pulsed or other open protocol communication output meters are not sufficient to award the credit for these building types.
CN2	Monitoring energy consumption by separately occupied and functional areas	Where there are no areas that meet the conditions specified in criterion 6 this credit will be filtered out.
CN3	Combined sub-metering – Electric space heating or water heating and small power equipment	For bedrooms and associated spaces in residential institution (long-term stay) building types, it is acceptable for an electric heating system to be combined with lighting and small power for metering purposes. Sub-metering must be provided for each floor plate or other appropriate sub-division.
CN4	Excluding large untreated areas	For industrial buildings, where there are offices and the internal spaces are not serviced by heating ventilation or HVAC systems and will have no energy-intensive systems or processes, the warehouse space can be excluded from the calculation of 'gross internal floor area' to determine whether option a) or b) is applicable for criteria 4 or 7.
CN5	Self-contained dwellings or units with individual utility meters	Where self-contained dwellings or units covered by the assessment have their own individual energy supply and utility meter (e.g. water, gas, or electricity), this supply is excluded from assessment. All shared energy supplies and common areas under the responsibility of building management are still included. For example, if self-contained flats in an assisted living development have individual gas supplies with their own utility meter, this supply will be excluded from the assessment. If the lighting and small power is shared on each floor, this shared supply will need to be sub-metered in accordance with the criteria.
CN6	Sub-metering by calculation / monitoring by difference	Two direct meters may be used to estimate a third by difference, e.g., where total external lighting consumption and car park lighting consumption are both measured, the difference between the two will be other external lighting consumption. Where an energy monitoring and energy management system is used, the software should be capable of calculating and displaying all required end-uses in line with the criteria.
CN7	Point of use water heaters	'Point of use' water heaters are excluded from the sub-metering requirements.
CN8	Centralised air handling units (AHU)	Where it is not technically feasible to separately meter energy use by floor plate or functional area of a centralised AHU, the requirements of the second credit do not need to be applied to the AHU. The credit will be assessed based on the rest of the energy uses applicable.
CN9	Head-end systems for smart meters	As the central component in an Advanced Metering Infrastructure (AMI), head end systems allow data communication and collation from a large and disparate set of smart meters. Where smart energy meters and sub-meters are to be installed, a head-end system is required for any strategy utilising this technology to be considered for compliance.
CN10	Sub-metering using non-intrusive load monitoring (NILM) systems	Non-intrusive load monitoring (NILM) systems cannot be used to demonstrate compliance for the sub-metering credits within BREEAM. Hardware-based sub-meters must be installed. NILM systems are generally retrofit systems which can be easily removed and are not integral to the building or installed building services.

Evidence

Criteria	Interim design stage	Final post-construction stage
Estimating annual energy consumption		
1	Estimates of energy consumption by energy	No further actions required post-construction;

Criteria	Interim design stage	Final post-construction stage
	source including an indication of how the estimates were derived	no additional evidence is required other than that listed for the design stage.
Energy monitoring by end-use and for different occupiers and functional areas		
2, 3, 6	The metering schedule or metering strategy document. Floor plans showing functional or tenanted areas, where applicable.	The final construction or equivalent metering schedule or metering strategy document. Assessors site inspection report and photographic evidence. OR Screenshots from the energy monitoring system showing data from the meters where installed.
4, 7	Specification for the energy monitoring system and/or meters.	Final construction drawings, specification, manufacturer's product data or O&M documentation for the installed energy monitoring system and/or meters. Assessors site inspection report and photographic evidence.
5, 8	The metering schedule or metering strategy document.	Assessor site inspection report and photographic evidence showing the labelled meters. OR Screenshots from the energy monitoring system showing data from the meters and what they relate to, where installed.

Definitions

Accessible meters

Energy meters located for easy access to allow regular monitoring and readings by building occupants or facilities managers. Typically, this will be a plant room, main distribution room or control room where a building energy management system (BEMS) is installed.

Common areas

Shared facilities, spaces, and access that are not owned or controlled by any individual tenant or occupier. These are typically managed and maintained by the development's owner or managing organisation. Examples include atria, stairwells, entrance foyers and external areas.

Energy meters

Devices that measure the amount of energy used on a circuit while energy is flowing.

- Primary meters measure main incoming energy and are used for billing by the utility supplier.
- Sub-meters are installed to measure consumption by specific items of plant or equipment, or to discrete physical areas, e.g. individual buildings, floors, tenanted areas or function areas.

Energy monitoring and management system

A system that provides users with data about energy consumption patterns in a building to facilitate informed energy management decisions.

In addition to providing real time data on energy consumption they may also flag faults in equipment and in some cases remotely activate or deactivate equipment. They may have the ability to provide performance indicators that can be used to measure performance against targets and provide real time alerts in instances where energy use is unexpected such as equipment left on after hours.

Energy supply

All types of energy supplied to a building area (function area, department, tenancy, or unit) within the boundary of the assessed development. This includes electricity, gas, heat or other forms of energy or fuel that are consumed from the use of, and operations within, each relevant area.

Functional areas

Areas with significantly different energy loads, controls, occupation, or usage patterns.

Operational energy

Energy consumption for all end uses present when the building is operational except for industrial scale process loads. Operational energy includes both regulated and unregulated energy consumption.

Pulse output meters (and other acceptable open protocol communication output alternatives)

A pulsed output meter generates an output signal when a specified amount of electricity, water, or gas passes through it.

Acceptable alternatives must meet or exceed the capabilities of a pulsed output meter.

The following is a non-exhaustive list of metering standards or technologies that are currently recognised as alternative to pulsed output meters:

- M-bus (i.e. systems that comply with the EN 13757 series of standards). Also includes systems complying with OMS (Open Metering System) standards.
- BACnet (BS EN ISO 16484-5)
- Modbus (ISO 1574-4, TCP only)
- KNX (BS EN ISO/EC 14543, BS EN 50090)
- 4G/LTE (3GPP LTE)
- LonWorks (ISE/IEC 14908)
- For IT related equipment and systems:
    - MQTT (BS ISO/IEC 20922)
    - OPC UA (BS EN IEC 62541)
    - SNMP (IETF RFC 1157:1990, IETF:RFC 3411:2002)

Additional information

None.

Ene 04 Low carbon design

(all buildings)

Aim

To encourage design measures that reduce energy demand and the installation of local low and zero carbon energy generation technologies to reduce carbon emissions.

Overview

Assessment type	Credits available	Minimum standards	Applicable assessment criteria
Part 1: Fabric and structure	up to 4	None	All (see 2.0 and 2.1)
Part 2: Core services	2	None	8–10 (see 2.0 and 2.1)
Part 3: Local services	2	None	8–10 (see 2.0 and 2.1)
Part 4: Interior design	0	None	Not applicable

Assessment type specific notes

Ref	Assessment type specific note
-	None

Building type specific notes

Ref	Building type specific note
2.0	**Historic buildings – Fabric performance optimisation** If there are no constrains on the building's fabric due to it being a historic building, credits can be achieved as stated in criteria 1–7. Where there are constraints on the building's fabric and subsequently no improvement can be made to the building's fabric performance, the Fabric performance optimisation credits may be filtered out.
2.1	**Historic buildings – Low and zero carbon energy generation technologies** Where there is no scope for installing LZC technology due to the historic building restraints (criteria 8–10), the Low and zero carbon energy generation technologies credits may be filtered out.

Issue specific notes

Ref	Issue specific note
3.0	**Highly de-carbonised mains grid – LZC energy generation technologies** The low and zero carbon energy generation technologies credits (criteria 8–10) are filtered out where the assessed building is in a country where ≥ 80% of mains grid electricity is from non-fossil fuel sources.

Assessment criteria

Up to two credits – Fabric performance optimisation

Analysis of alternative fabric specifications

1 The project team carries out an analysis of the proposed refurbishment to explore the impact of alternative fabric specifications on the building's demand for heating and cooling.

One credit – 5% reduction in building energy demand

2 Achieve criterion 1.

3 Implement fabric performance measures which reduce the overall building heating and cooling energy demand by ≥ 5% compared to minimum values set by building regulations for renovations.

OR

Two credits – 10% reduction in building energy demand

4 Achieve criterion 1.

5 Implement fabric performance measures which reduce the overall building heating and cooling energy demand by ≥ 10% compared to minimum values set by building regulations for renovations.

OR

Two credits – Fabric performance has been optimised

6 Achieve criterion 1.

7 Demonstrate that the fabric specification has minimised the demand for heating and cooling.

See Methodology M1.

Up to two credits – Low and zero carbon energy generation technologies

One credit – Installation of LZC energy generation technologies

8 One or more eligible LZC energy generation technologies have either been newly installed by competent installers or have been previously installed and are operational.

One credit – Meeting LZC energy generation targets

9 Achieve the 'Installation of LZC energy generation technologies' credit (criterion 8).

10 The energy generated by the installed LZC energy generation technologies meet the following targets:

10.a Where photovoltaic (PV) panels are the only LZC energy generation technology installed, the electricity generated must:

10.a.i Be equal to, or exceed, that generated by reference PV panels covering 50% of the ground floor area.

OR

10.a.ii Account for ≥ 60% of the building's annual electricity consumption.

10.b Where only LZC energy generation technologies other than PV panels are installed, the energy generated must:

10.b.i Be equal to, or exceed, 137 kWh/year/m² of ground floor area.

OR

10.b.ii Meet ≥ 60% of the building's annual demand for the relevant energy source.

10.c Where the installed LZC energy generation technologies include both PV panels and other LZC energy generation technologies, selected generation targets as listed in 10.a and 10.b should be used in conjunction scaled proportionally to the amount of electricity generated by each technology (see M2.4).

Methodology

M1: Fabric performance optimisation

M1.1: Analysis of fabric performance

The analysis to reduce energy demand from heating and cooling must consider the following:

1. Fabric insulation
2. Thermal mass to store heat or coolth
3. Air tightness
4. Solar gains

The analysis should consider the effect of different products and materials using energy modelling tools that take account of heat transfer characteristics, solar gains and the effect of thermal mass and other types of fabric thermal storage on heating and cooling.

Where site constraints or the refurbishment scope means that some fabric performance considerations cannot be addressed, any exclusions must be clearly justified by a suitably qualified energy modelling engineer or accredited professional. Where none of the points can be addressed, the credit cannot be awarded.

M1.2: Quantifying a reduction in the energy demand

The reduction in energy demand must be measured by comparing the demand for heating and cooling for the actual building compared to standard practice. Where standard practice is a version of the actual building with a fabric specification set by either:

— Baseline fabric values for the relevant climate region from ASHRAE Appendix G 2016 or later.

OR

— Minimum fabric specifications defined by local building regulations.

One of the energy modelling software packages or calculation tools for either Ene 01 or Ene 02 must be used, and the modelling must be carried out by a suitably qualified energy modelling engineer or accredited professional.

M1.3: Optimised fabric performance

Fabric performance is optimised where a change in the value of any of the fabric parameters in either direction would lead to an increase in the total heating and cooling demand, or no further improvement.

M2: Low and zero carbon energy generation technologies

M2.1: Eligible LZC energy generation technologies

Only local LZC energy generation technologies that use the following energy sources can be used for this issue:

— Wind
— Solar radiation (solar thermal and solar photovoltaic)
— Geothermal and hydrothermal energy sources
— Hydropower
— Waste heat from operational processes

Waste heat from operational processes includes manufacturing processes, high temperature oven or kiln, compressors serving process plant, microbrewery, crematorium, testing and commissioning boilers for training or manufacture, and data centres.

It does not include waste heat from IT or server rooms, which could be used as part of conventional heat recovery measures.

The following are **not** eligible LZC energy generation technologies for this issue:

— Heat or electricity generated from a waste incineration plant.
— Biomass or biofuels from first generation biomass feedstock.
— Heat generated by heat pumps.

For further information, see Additional information on page 219.

Biomass from second generation biomass feedstock or waste sources may be eligible provided they meet the specific requirements for these sources outlined below.

M2.1.1: Biofuels from second-generation biomass feedstock or waste

BREEAM **may** recognise systems using biofuels generated from locally sourced second-generation feedstocks or biofuels manufactured from biodegradable waste materials, including landfill gas and sewage treatment gas. Further detail about the biomass source, the supply chain, and the installed plant is required for review by BRE Global prior to confirmation of acceptability.

The details provided should include:

1. Type, source, and sustainability of the biomass feedstock.
2. Avoidance or minimisation of fossil fuel use in:
    a. extraction
    b. transportation of the biomass or biofuel.
3. Presence of a supply agreement and a robust supply chain.
4. Compatibility of the biofuel with the specified boiler or plant and manufacturer's warranty issues.

BREEAM does not define the term 'locally sourced' or specify a minimum supply contract. However, the assessor must determine and demonstrate that these are reasonable for the application.

For the definitions of first- and second-generation biofuels, see Definitions on page 218.

M2.2: Local LZC energy generation technologies

To be recognised as a local LZC energy generation technology the system must be located on-site or near-site and must either:

— Have a direct (private wire) connection to the assessed building.

OR

— Where it is impractical to physically connect the assessed building, the LZC energy generation system(s) must be located on the same site and be owned and managed by the same organisation as the assessed building.

M2.3: Competent installation

Where an independent regional or national certification scheme for renewable energy system installers exists, these technologies must be certified in accordance with the relevant scheme.

Where such schemes do not exist, the design team must show that they have investigated, and are confident in, the skill and competence of the installers to install the technology appropriately.

Where there are existing LZC energy generation systems, the design team must confirm that the existing systems are subject to regular maintenance inspections.

M2.4: Calculating energy generated by LZC technologies

The predicted annual energy generated by LZC systems should be calculated on an annual basis and take account of climate and the orientation and location of the system. For example, for PV panels the calculation should take account of hours of peak sunlight for the location, the orientation of the panels, and any shading.

The calculation must be carried out by, or checked by, a suitably qualified energy modelling engineer or accredited professional, or an LZC specialist.

Where the installed LZC energy generation technologies include both PV panels and other LZC energy generation technologies, the generation targets should be adjusted proportional to the amount of electricity generated by each.

For example, if 50% of local LZC energy is generated by PV panels and 50% by a wind turbine this could be met with PV panels with an efficiency of 0.2 kWp/m² covering 25% of the ground floor area and a wind turbine that generates 68.5 kWh per year for each square metre of ground floor area.

For existing LZC technologies the amount of energy generated annually may be based on annual measured data.

M2.4.1: Reference PV panels

A reference PV panel has a rated peak power output of 0.2 kWp/m² is oriented horizontally, with no or very little overshading, and with strongly ventilated or forced ventilated modules.

M2.4.2: Historic buildings

Where there are restraints on the installation of LZC technology but the LZC technology credits have not been filtered out, credits can be achieved as stated in criteria 8 to 10. Where this is the case, the ground floor area for the credits calculation can instead be based on the ground floor area that is not under historic building constraints.

M2.5: Calculating the reduction in energy consumption

The percentage of the building's predicted energy consumption that will be met by energy generated by LZC technologies must be calculated on a net annual basis for each energy source e.g., electricity, heat.

$$\frac{Energy\ generated\ by\ local\ LZC\ technology\ per\ year}{Energy\ consumption\ of\ the\ building\ per\ year} \times 100 = \%\ net\ annual\ energy\ generated$$

Where energy consumption has been predicted for Ene 02, these values should be used to determine the proportion of the building's predicted energy consumption that is generated by LZC technologies. Otherwise, energy consumption estimates may be derived from simple energy modelling results (including NCM calculations), benchmarks, data for similar projects, or simple engineering calculations and/or based on measured energy consumption data.

M2.6: LZC energy generation systems that serve more than one building

Where an LZC energy generation system will serve more than one building, the proportion of annual energy that is attributed to the assessed building should be based on the predicted annual energy consumption of that building compared to the measured or estimated annual energy consumption for all buildings connected to the LZC energy generation system, minus net annual renewable energy exports to the grid.

Compliance notes

Ref	Terms	Description
CN1	Fabric performance optimisation – Existing building elements are retained	In circumstances where an existing building element (e.g., a facade) is being retained they must be included in the baseline fabric specification when calculating the reduction in energy demand.
CN2	LZC energy generation technologies – Systems connected at a later stage	If LZC energy generation systems are owned by a third-party and will be connected after post-construction certification, a binding contract specification for the proposed work must be submitted. This must include proposed timescales for this work.
CN3	LZC energy generation technologies – District heating system using multiple fuels	Where the building is connecting to a district heating system and this burns a mixture of eligible and non-eligible energy sources, only the proportion of output generated from eligible renewable fuels can be considered for this issue. For instance, a system burns 25% compliant biofuels and 75% fossil fuels – only 25% of heat is recognised for this issue. As fuel mixes may vary over time, provide at least one year or more of historical information to account for seasonal variations. Where the system is new or proposed, robust evidence must be provided of the anticipated fuel mix. The fuel mix must be calculated based on the energy content of the input fuels in kWh.
CN4	LZC energy generation technologies – Local regulations and private wire arrangements	Where local regulations do not permit electricity generated by on-site renewables to be connected directly to the building, and where evidence of the relevant regulations is provided at QA, the requirement for a private wire arrangement can be waived.

Evidence

Criteria	Interim design stage	Final post-construction stage
Fabric performance optimisation		
1	A copy of the analysis of fabric performance, completed in line with M1.1.	A copy of the analysis of fabric performance, completed in line with M1.1.
3, 5, 7	Modelling results demonstrating the reduced	Final construction drawings or equivalent, air

Criteria	Interim design stage	Final post-construction stage
	energy demand for heating and cooling arising from the proposed fabric specification and, where relevant, that the fabric performance has been optimised as far as possible.	test results or assessor site inspection report and photographic evidence to show how the outcomes of fabric performance analysis have been implemented within the final design.
Low and zero carbon energy generation technologies		
8	Technical specification for LZC energy generation technology and where appropriate, plan drawings of the building showing the LZC energy generation systems Confirmation that the systems will be installed by competent installers or that the installation will be certified.	Specification for the LZC energy generation system(s) and final construction drawings or equivalent of the building showing the LZC energy generation systems. Confirmation of the competency of the installers or certification of the installation.
10.a	Technical specifications of PVs and plan drawings of the building with the PV panels. Calculations showing the predicted carbon reduction from the PV panels meets the energy generation target.	Technical specifications of PVs and final construction drawings or equivalent of the building with the PV panels. OR Assessor site inspection report and photographic evidence. AND Updated calculations for the installed system showing the predicted carbon reduction from the PV panels meets the energy generation target.
10.b	Technical specifications of LZC energy generation system(s) and plan drawings of the building with the LZC energy generation systems(s) installed. Calculations showing the predicted carbon reduction from the LZC energy generation systems(s) meets the energy generation target.	Technical specifications of LZCs and plan drawings of the building with the LZCs as built. OR Assessor site inspection report and photographic evidence. AND Updated calculations for the installed systems showing the predicted carbon reduction from the LZCs meets the energy generation target.

Definitions

First generation biofuels

Fuels that are produced from edible food crop that are grown or farmed for the purposes of biofuel production.

Ground floor area

The maximum area of a building or structure to the outside wall measurement.

Low and zero carbon specialist

An individual who:

a. Is not professionally connected to a single LZC technology or manufacturer.

   AND, either:

b. Has carried out LZC assessments for at least 3 years.

   OR

c. Has a recognised qualification for undertaking assessments, designs, or installations of LZC solution in the building sector.

Second generation biofuels

Biofuels produced from non-food feedstocks or biofuels manufactured from biodegradable waste materials, e.g., biogas, waste vegetable oil or locally and sustainably sourced solid biofuels, e.g., woodchip, wood pellets.

Suitably qualified energy modelling engineer or accredited professional

An individual who has:

1. A minimum of 3 years relevant experience in building energy modelling within the last 5 years.
2. A recognised qualification or chartership such as a building services engineer or building energy modelling engineer.
3. Broad expertise to cover all required technical aspects, guaranteeing that the data entry in the energy model is appropriate and the results reflect the actual performance of the building.

Where the modelling is being carried out a team of modellers, their combined experience must meet the individual requirements.

Suitably qualified member of the project team – building form analysis

A building design professional with a minimum of 3 years relevant experience in building form analysis.

Third party

"A person or body that is recognised as being independent of the parties involved, as concerns the issue in question" (BS EN 15804:2012+A1:2013).

The suitably qualified energy modelling engineer or accredited professional third-party verifier must be independent of the energy modeller who created the model and demonstrate impartiality (for general principles, see ISO 17029). To qualify as a third party, the verifier must belong to an organisation not involved in the project and must not provide advice to the project, as this could compromise their impartiality during verification.

Additional information

Exclusion of waste heat or electricity from an incineration plant from LZC energy generation technologies

BREEAM no longer recognises waste heat or electricity from an incineration plant for this issue. This is because of the potential for adverse health and environmental impacts associated with this form of energy particularly from older plants. And because waste from heat can act as a disincentive for reuse and recycling and may destroy recoverable materials.

Exclusion of heat pumps from the list of LZC energy generation technologies

BREEAM no longer recognises heat pumps for this issue. This is because a heat pump does not generate heat, but transfers heat from outside the building and requires electricity or another energy source to operate. This applies to all types of heat pumps including ground source, air source, and water source systems.

The energy efficiency benefits of heat pumps are recognised in Ene 01 and Ene 02.

Exclusion of first-generation biomass feedstock from LZC technologies

BREEAM does not reward building systems fuelled by first generation biofuels. This is because of the high levels of uncertainty over their impact on biodiversity, global food production, and their life cycle greenhouse gas savings.

Ene 05 Energy efficient equipment

(all buildings)

Aim

To recognise and encourage the procurement of energy efficient equipment to minimise energy consumption and carbon emissions in operation.

Overview

Assessment type	Credits available	Minimum standards	Applicable assessment criteria
Part 1: Fabric and structure	0	None	Not applicable
Part 2: Core services	up to 5	None	All (see ref 3.0)
Part 3: Local services	up to 5	None	All (see ref 3.0)
Part 4: Interior design	up to 5	None	All (see ref 3.0)

Assessment type specific notes

Ref	Assessment type specific note
-	None

Building type specific notes

Ref	Building type specific note
-	None

Issue specific notes

Ref	Issue specific note
3.0	This issue is filtered out where there is no “in-scope” equipment present.

Assessment criteria

Up to five credits – Energy efficient equipment

1 Identify items of equipment in the project specification (in-scope equipment) that are users of unregulated energy (see M1).

2 Estimate the expected annual energy consumption by the in-scope equipment identified in criterion 1 (see M2).

3 Determine the ratio of in-scope unregulated energy use by equipment to regulated energy use to determine the number of credits available (see Table 45 below and M3).

Table 45: Energy efficient equipment credits available

In-scope unregulated energy use by equipment / regulated energy use (%)	Credits available
No in-scope equipment OR Energy consumption of in-scope equipment is not significant	Issue filtered out
< 10%	1
≥ 10% and < 20%	2

In-scope unregulated energy use by equipment / regulated energy use (%)	Credits available
≥ 20% and < 30%	3
≥ 30% and < 40%	4
≥ 40%	5

4 Determine which in-scope equipment items are energy efficient (see M4).

The number of credits awarded is proportional to the percentage of energy use by in-scope equipment that uses energy efficient equipment as follows:

Number of credits = (% of in-scope equipment that is energy efficient × number of credits available) rounded to the nearest whole number.

Methodology

M1: Scope of unregulated energy using equipment

For Part 2, energy using equipment situated in common areas or providing services to all areas of the building must be included in the scope of the assessment.

For Part 3, energy using equipment serving separate functional areas or separately tenanted areas must be included in the scope of the assessment.

For Part 4, any energy using equipment that is included as part of the fit out must be included in the scope of the assessment.

Any equipment that is newly installed, refurbished, or renovated that falls within the scope of the relevant Parts, as defined above, are to be included in the assessment unless one or more of the following conditions apply:

1. They are part of an industrial process.
2. They provide temporary services e.g., external lighting for theatrical, stage, and local display installations.
3. They are only used when maintenance work is being carried out.
4. They are only used in an emergency.
5. There are overriding safety, security or accessibility requirements that prevent energy efficiency criteria being met by any relevant compliance routes.
6. Reused equipment (that was not previously used in the building) is used in place of new equipment (due to the reduction in embodied carbon).
7. The equipment is mobile and is likely to be used outside of the building (for example, laptop computers).
8. The equipment is a bespoke (unique) item that has been made specifically for the project and cannot be compared to standard equipment.

Energy using equipment **may** be excluded from the assessment where the additional cost of procuring energy efficient equipment is expected to exceed the cost savings from reduced energy consumption over the lifetime of the equipment. This is more likely to be the case for items with low annual energy consumption. As a guide this is likely to occur where the expected annual energy consumption of equipment is lower than 100 kWh per year, which equates to a small domestic refrigerator.

All other in-scope energy using systems must be included in the assessment.

M2: Estimating energy use by in-scope equipment

Where annual operational energy consumption has been calculated in accordance with Ene 02, the annual energy uses for in-scope equipment should be based on data inputs for prediction modelling. Otherwise, energy consumption estimates may be derived from simple energy modelling results (including NCM calculations), benchmarks, data for similar projects, engineering calculations (see simple example of an engineering calculation below), or other appropriate estimation methods. Where the system is an existing system, previous metered data can be used to determine the annual energy consumption for that system.

$$\text{kWh per year} = \text{kW rating} \times \text{Load factor} \times \text{Annual use hours}$$

where:

kW rating = Maximum power consumption of the equipment.

Load factor = Average power consumption when the equipment is in use/kW rating.

The estimated annual energy consumption for each type of in-scope equipment must be entered into the BREEAM Platform.

At the pre-assessment stage the number of credits available may be estimated by entering a rough estimate of the total energy consumption for all in-scope equipment. This must be replaced by estimates of the energy consumption for each item of equipment before the assessment is submitted.

M3: Determining the number of credits available

The methodology for calculating the annual energy consumption for in-scope energy using equipment is described in M2.

Regulated energy use should be estimated based on measured energy consumption data for the existing building, adjusted to take account of any change in energy consumption due to the refurbishment. Alternatively, energy modelling results e.g., for Ene 02 or estimates from data for similar projects or benchmarks may be used.

In all cases the annual regulated energy must be entered into the BREEAM Platform and is used to determine the ratio of in-scope equipment to regulated energy use as follows:

$$\frac{Annual\ energy\ consumption\ for\ all\ in-scope\ equipment}{Annual\ energy\ consumption\ for\ regulated\ end\ uses} \times 100\%$$

This is used to determine the number of credits available according to Table 45 on page 220.

M4: Demonstrating energy efficiency

There are two routes for demonstrating that equipment is energy efficient:

1. Where the equipment is more energy efficient than that of a standard item of equipment (see M4.1).
2. Where the equipment meets specific "deemed to comply" energy efficiency requirements (see M4.2).

Deemed to comply energy efficiency requirements are only provided for some types of equipment.

Where deemed to comply requirements exist, the energy efficiency compared to a standard version of the equipment may still be used to demonstrate compliance for this issue.

M4.1: Demonstrating energy efficiency compared to a standard version of the equipment

A standard version of equipment is defined as having an energy performance that is typical and only has energy efficient features that are common for that type of equipment.

The performance of a standard version of equipment might be determined based on a non-exhaustive search for products of the same type.

To demonstrate that the actual equipment procured is more energy efficient than the standard version of equipment, it must be demonstrated that the energy performance of the actual equipment achieves a meaningful reduction in energy consumption compared to the standard version.

Where technical data on both the actual and standard version of the equipment is readily available, this should be used to calculate the percentage reduction in energy consumption. This calculation, alongside justification for both the selection of the standard product and the acceptance of the achieved percentage reduction over the standard product as meaningful, should be provided in each case to demonstrate that a given item of equipment is energy efficient.

Note: The percentage reduction in energy consumption does not impact the number of credits awarded.

M4.2: Deemed to comply energy efficiency requirements for equipment

Energy labelling and listing schemes that are deemed to comply with the energy efficiency requirements for this issue are listed in Table 46 on the next page.

Table 46: Deemed to comply requirements for energy labelling and listing schemes

Equipment	Labelling scheme or list	Requirement
All equipment types	ENERGY STAR® (United States Environmental Protection Agency)[1]	Certified
	Energy Technology List (UK Government)[2]	Listed
Fridges	EU Energy Efficiency Labelling Scheme (March 2021)[3]	E or above
	Energy Rating label (Australian Government)[4]	3.5 stars or above
Fridge freezers	EU Energy Efficiency Labelling Scheme (March 2021)	E or above
Freezers	EU Energy Efficiency Labelling Scheme (March 2021)	D rating or above
	Energy Rating label (Australian Government)	3.5 stars or above
Washing machines	EU Energy Efficiency Labelling Scheme (March 2021)	B rating or above
	Energy Rating label (Australian Government)	4 stars or above
Washer dryers	EU Energy Efficiency Labelling Scheme (March 2021)	D rating or above
Tumble dryers	EU Energy Efficiency Labelling Scheme (March 2021)	D rating or above
Room air conditioners	EU Energy Efficiency Labelling Scheme (original)	B or above
Computer monitors	EU Energy Efficiency Labelling Scheme (March 2021)	D rating or above
	Energy Rating label (Australian Government)	6 stars or above
Dishwashers	EU Energy Efficiency Labelling Scheme (March 2021)	C rating or above
	Energy Rating label (Australian Government)	3.5 stars or above
TVs	EU Energy Efficiency Labelling Scheme (March 2021)	E rating or above
	Energy Rating label (Australian Government)	5 stars or above

M4.3: Other energy labelling schemes and energy efficiency list

Other energy labelling schemes and energy efficiency criteria are recognised where it can be demonstrated by the assessor that the scheme or criteria:

1. Are nationally or regionally recognised.
2. Effectively identify energy efficient products.
3. Are independently managed and operated by governments or other independent bodies.

Where other energy labelling schemes or energy efficiency criteria are used, the assessor must confirm that the labelling scheme or list meets these requirements.

M5: Determining the number of credits achieved

The total annual energy consumption of in-scope equipment is determined based on the estimated energy consumption data entered in the BREEAM Platform, as described in M2.

Where equipment is demonstrated to be energy efficient in accordance with M4 this should be indicated in the BREEAM Platform.

The number of credits achieved is calculated in the BREEAM Platform as follows:

$$\frac{\textit{Annual energy consumption by in-scope equipment that is energy efficient}}{\textit{Annual energy consumption from in-scope equipment}} \times \textit{Number of credits available}$$

Partial credits are rounded to the nearest whole number.

1 https://www.energystar.gov/products

2 https://etl.energysecurity.gov.uk/products

3 https://eprel.ec.europa.eu

4 https://calculator.energyrating.gov.au

Compliance notes

Ref	Terms	Description
CN1	Design team lacks relevant specialist knowledge	Where the design team lack the relevant specialist knowledge, calculations and analysis may be carried out by specialist contractors, manufacturers, suppliers, or installers. The assessor must be satisfied that the analysis has been carried out correctly and compliant evidence provided.

Evidence

Criteria	Interim design stage	Final post-construction stage
1	Design drawings, relevant sections of the building specification, equipment schedules or other documentary evidence identifying all proposed in-scope equipment. Where items with low annual energy consumptions have been excluded from the scope due to the cost of replacement, this must be stated and justified.	Updated documentation or correspondence identifying the unregulated energy using systems that are included within the project specification, assessor site inspection report, photographic evidence or other documentary evidence to verify the unregulated energy using systems that have been installed. Where items with low annual energy consumptions have been excluded from the scope due to the cost of replacement, this must be stated and justified.
2	Calculations to show the estimated energy consumption for all in-scope equipment.	Updated calculations to account for any changes to the building specification.
3	Where not automatically calculated from Ene 02, supporting data to confirm regulated energy consumption values.	No further actions required post-construction; no additional evidence is required other than that listed for the design stage.
4	Where compliance demonstrated by comparison to a standard version of the equipment, acceptable evidence sources include: — Written justification for the selection and benchmarking of the standard product based on reasonable assumptions or basic market research. — Specific clauses from reports or manufacturer's literature relating to the energy performance of the actual product. — Specific clauses from reports or manufacturer's literature relating to the energy performance of the standard product. Plus: — Where available, calculations showing that the actual product is more energy efficient than the standard product. Where a percentage reduction in energy consumption has been accepted as signifying a meaningful reduction in energy efficiency, then this should be stated and justified.	Where compliance is demonstrated by comparison to a standard version of the equipment, acceptable evidence sources include: — Manufacturer' literature relating to the energy efficiency of the actual installed equipment. — Final construction drawings/equipment schedules or equivalent, assessor site inspection report and photographic evidence or proof of purchase to verify installed products or equipment. Plus: — Calculations showing that the actual product is more energy efficiency than the standard product. Where a percentage reduction in energy consumption has been accepted as signifying a meaningful reduction in energy efficiency, then this should be stated and justified. Where compliance is demonstrated by meeting the deemed to comply energy labelling schemes and lists, acceptable evidence sources include:

Criteria	Interim design stage	Final post-construction stage
	Where this is demonstrated by meeting the deemed to comply energy labelling schemes and lists, acceptable evidence sources include: — Relevant section of the building specification, equipment schedules or contract clauses. — Where products are specified, manufacturer's literature or copy of the energy rating label, indicating the energy labelling scheme and the rating achieved. AND In addition to the above, where this is demonstrated by meeting other energy efficient labelling schemes or energy efficiency listings, confirmation that the energy efficient labelling scheme or listing is: — Nationally or regionally recognised. — Effectively identifies energy efficient products.	— Final construction drawings/equipment schedules or equivalent, assessor site inspection report and photographic evidence or proof of purchase to verify installed products or equipment. — Manufacturer's literature or copy of the energy rating label, indicating the energy labelling scheme and the rating. AND In addition to the above, where this is demonstrated by meeting other energy efficient labelling schemes or energy efficiency listings, confirmation that the energy efficient labelling scheme or listing is: — Nationally or regionally recognised. — Effectively identifies energy efficient products.

Definitions

Energy using equipment

A standalone item of machinery that can perform its intended function without additional components or controls.

Energy using equipment is assessed in this issue (Ene 05).

Energy using system

Machinery that consists of multiple components that must be connected and configured to perform its intended function.

Energy using systems are assessed in Ene 06.

Regulated energy

Building energy consumption resulting from the specification of fixed building services and fittings, including space heating and cooling, hot water, ventilation, fans, pumps and lighting that are generally controlled through the applicable building regulations and are included in the scope of the Ene 01 assessment.

Unregulated energy

Building energy consumption resulting from building services and fittings that are not generally covered by building regulations and are not included in the scope of the Ene 01 assessment.

Additional information

Worked example of credits available and credits awarded

In-scope equipment are fridges, servers, and computer monitors.

Regulated energy consumption is 7000 kWh per year.

The estimated energy consumption for in-scope equipment is estimated to be:

— Fridges: 700 kWh per year

— Servers: 1400 kWh per year

— Computer monitors: 300 kWh per year

$$\frac{\textit{Unregulated energy use}}{\textit{Regulated energy use}} = \frac{2400}{7000} \times 100 = 34.29\% = 4\ \textit{credits available}$$

Of the in-scope equipment, the fridges and the computer monitors are deemed to be energy efficient, but the servers are not.

Percentage of energy consumption for in-scope equipment that meet the requirements is:

$$\left(\frac{700 + 300}{700 + 300 + 1400}\right) \times 100 = 41.66\%$$

0.4166 × 4 = 1.67 = 2 credits achieved (out of 4 credits available)

Note that this calculation procedure is provided for information only. The credits available and awarded will be determined within the BREEAM Platform based on data entered into the system.

Ene 06 Energy efficient systems

(all buildings)

Aim

To recognise and encourage the procurement of energy efficient systems to minimise energy and carbon emissions in operation.

Overview

Assessment type	Credits available	Minimum standards	Applicable assessment criteria
Part 1: Fabric and structure	0	None	Not applicable
Part 2: Core services	up to 9	None	All (see ref 3.0)
Part 3: Local services	up to 9	None	All (see ref 3.0)
Part 4: Interior design	up to 9	None	All (see ref 3.0)

Assessment type specific notes

Ref	Assessment type specific note
-	None

Building type specific notes

Ref	Building type specific note
-	None

Issue specific notes

Ref	Issue specific note
3.0	This issue is filtered out where there are no “in-scope” systems present.

Assessment criteria

Up to nine credits – Energy efficient systems

1 Identify systems in the project specification (in-scope systems) that are users of unregulated energy (see M1).

2 Estimate the expected annual energy consumption by in-scope systems identified in criterion 1 (see M2).

3 Determine the ratio of in-scope unregulated energy used by systems to regulated energy use to determine the number of credits available (see Table 47 below and M3).

Table 47: Credits available

In-scope unregulated energy using systems / regulated energy use	Credits available
No in-scope equipment OR Energy consumption of in-scope systems is not significant	Issue filtered out
< 10%	1
≥ 10% and < 20%	2

In-scope unregulated energy using systems / regulated energy use	Credits available
≥ 20% and < 30%	3
≥ 30% and < 40%	4
≥ 40% and < 50%	5
≥ 50% and < 60%	6
≥ 60% and < 70%	7
≥ 70% and < 80%	8
≥ 80%	9

4 Determine in-scope systems that are energy efficient (see M4).

The number of credits awarded is proportional to the percentage of energy use by in-scope systems that uses efficient systems as follows:

Number of credits = (% in-scope systems that are energy efficient × number of credits available) rounded to the nearest whole number.

Methodology

M1: Identifying in-scope unregulated energy using systems

For Part 2, energy using systems situated in common areas or providing services to all areas of the building must be included in the scope of the assessment.

For Part 3, energy using systems serving separate functional areas or separately tenanted areas must be included in the scope of the assessment.

For Part 4, any energy using systems that is included as part of the fit out must be included in the scope of the assessment.

Any systems that are newly installed, refurbished, or renovated that fall within the scope of the relevant Parts, as defined above, are to be included in the assessment unless one or more of the following conditions apply:

1. They are part of an industrial process.
2. They provide temporary services e.g., external lighting for theatrical, stage, and local display installations.
3. They are only used when maintenance work is being carried out.
4. They are only used in an emergency.
5. There are overriding safety, security or accessibility requirements that prevent energy efficiency criteria being met by any relevant compliance routes.
6. Reused systems and components (that were not previously used in the building) that are used in place of new systems (due to the reduction in embodied carbon).
7. The system is a bespoke (unique) item that has been made specifically for the project and cannot be compared to standard systems.

Energy using systems **may** be excluded from the assessment where the additional cost of procuring energy efficient system is expected to exceed the cost savings from reduced energy consumption over the lifetime of the system. This is more likely to be the case for systems with low annual energy consumption.

All other energy using systems that fall within the scope of the assessment must be included.

M2: Estimating energy use by in-scope systems

Where annual operational energy consumption has been calculated in accordance with Ene 02, the annual energy uses for in-scope systems should be based on data inputs for prediction modelling, otherwise, energy consumption estimates may be derived from simple energy modelling results (including NCM calculations), benchmarks, data for similar projects, engineering calculations (see equation below), or other appropriate estimation methods. Where the system is an existing system, previous

metered data can be used to determine the annual energy consumption for that system.

kWh per year = kW rating × Load factor × Annual use hours

where:

kW rating = Maximum power consumption of the system

Load factor = Average power consumption when the system is in use/kW rating

The estimated annual energy consumption for each type of in-scope system must be entered into the BREEAM Platform.

At the pre-assessment stage the number of credits available may be estimated by entering a rough estimate for energy consumption for all in-scope systems but will need to be replaced by energy estimates for each in-scope system before the assessment is submitted.

M3: Determining the number of credits available

The methodology for calculating the annual energy consumption for in-scope energy using systems is described in M2.

Regulated energy use should be estimated based on measured energy consumption data for the existing building, adjusted to take account of any change in energy consumption due to the refurbishment. Alternatively, energy modelling results e.g., for Ene 02 or estimates from data for similar projects or benchmarks may be used.

In all cases the annual regulated energy consumption must be entered into the BREEAM Platform and is used to determine the ratio of in-scope systems to regulated energy use as follows:

$$\frac{Annual\ energy\ consumption\ for\ in-scope\ systems}{Annual\ energy\ consumption\ for\ regulated\ end\ uses} \times 100\%$$

This is used to determine the number of credits available according to Table 47 on page 227.

M4: Demonstrating energy efficiency

There are two routes for demonstrating that a system is energy efficient:

1. Where the system is more energy efficient than that of a standard version of the system (see M4.1).
2. Where the systems meet specific "deemed to comply" energy efficiency requirements (see M4.2).

Deemed to comply energy efficiency requirements are only provided for some types of systems.

Where deemed to comply requirements exist, the energy efficiency compared to a standard version of the system may still be used to demonstrate compliance for this issue.

M4.1: Demonstrating energy efficiency compared to a standard version of the system

A standard system is defined as being a system that:

1. Has energy using components with energy efficiency levels that are typical for the component types.
2. Has not been designed to optimise energy consumption.
3. Has only energy efficient features and controls that are typical for the system type.

The performance of a standard version of a system might be determined based on a non-exhaustive search for systems of the same type.

To demonstrate that the actual version of the system procured is more energy efficient than a standard version of the system, it must be demonstrated that the energy performance of the actual system achieves a meaningful reduction in energy consumption compared to a standard version.

Where technical data on both the actual and standard version of the system is readily available, this should be used to calculate the percentage reduction in energy consumption. This calculation, alongside justification for both the selection of the standard product and the acceptance of the achieved percentage reduction over the standard product as meaningful, should be provided in each case to demonstrate that a given system is energy efficient.

Note: The percentage reduction in energy consumption does not impact the number of credits awarded.

M4.2: Deemed to comply energy efficiency requirements for systems

This is an alternative compliance route that is available for the following types of system:

- External lighting
- Cold storage
- Lifts and escalators
- Swimming pools
- Commercial laundries
- Cooling systems in server rooms

These system types do not have to meet the deemed to comply requirements and, may instead demonstrate that the actual system is more energy efficient than a standard version of the system (see M4.1).

M4.2.1: External lighting systems

M4.2.1.1: Deemed to comply requirements for external lighting systems

The deemed to comply requirements for external lighting systems are set out in Table 48 below.

Table 48: Deemed to comply requirements for external lighting systems

Ref	Requirements for external lighting systems
1	The average initial luminous efficacy across all in-scope external lighting systems within the construction zone achieves ≥ 70 luminaire lumens per circuit watt.
2	All external light fittings are automatically controlled to prevent operation during daylight hours and are fitted with presence detection in areas of intermittent pedestrian traffic.

Average initial luminous efficacy is calculated as the individual luminous fluxes of all luminaires within the construction zone summed (in lumens), then divided by the total circuit watts for all the luminaires.

The luminous flux of a luminaire is calculated as follows:

$$\frac{\sum_{all\ luminares}(Luminous\ flux\ lamp \times Light\ output\ ratio\ luminare)}{\sum_{all\ luminares} Total\ circuit\ watts}$$

Note: LED lighting typically has integral luminaires.

M4.2.2: Cold storage systems

M4.2.2.1: Scope of cold storage systems

This covers freezer or cold storage rooms which are integral to the building and includes cooling systems that require commissioning and optimisation for the specific requirements of the cold storage space. This applies whether the cold storage space has a dedicated cooling system serving this space, or one which is connected to wider building cooling services.

Commercial-sized, but self-contained, off-the-shelf cold storage system units such as large freezers, fridges, or stand-alone self-contained walk-in cold storage units that are manufactured as a self-contained product, and contain their own integral cooling systems, that operate according to manufacturer pre-sets, and do not require commissioning of the cooling system should be assessed under Ene 05 Energy efficient equipment.

M4.2.2.2: Deemed to comply requirements for cold storage systems

The deemed to comply requirements for cold storage systems are set out in Table 49 below.

All relevant requirements must be met for the system to be deemed energy efficient.

Table 49: Deemed to comply requirements for cold storage systems

Ref	Requirements for cold storage systems
1	**Energy efficient components** Where the following components are included, they must meet with the requirements of independent external labelling or listing criteria: 1. Air-cooled condensing units 2. Cellar cooling system

Ref	Requirements for cold storage systems
	3. Evaporative condensers 4. Packaged chillers 5. Refrigeration compressors 6. Refrigeration system controls Note: The energy technology list sets out energy efficiency criteria for these components (etl.energysecurity.gov.uk/products/refrigeration-equipment).
2	**Designed to minimise heat loss** Demonstrate the following: — High levels of insulation — Reduced air infiltration
3	**Controls to optimize temperature, humidity, and airflow management** This can be achieved by installing central automatic controls that include anti-tamper controls, automatic lighting controls, fixed set-point temperature and temperature dead bands.
4	**System will undergo commissioning and testing** The refrigeration system has been commissioned in compliance with criterion 7 in Man 04 Commissioning and handover. This does not require the 'Commissioning' credit to be awarded. Note: Documentation of the test and commissioning procedures relevant to the installation, such as pressure testing, leakage testing and validation to specification must be provided.

M4.2.3: Lifts and escalators

M4.2.3.1: Scope of lifts and escalator

This compliance route may be used for any lifting device with a rated speed > 0.15 m/s, inclusive of goods lifts, vehicle lifts, and passenger lifts.

M4.2.3.2: Deemed to comply requirements for lift and escalators

The deemed to comply requirements for lifts and escalators are set out in Table 50 below.

All relevant requirements must be met for the system to be deemed energy efficient.

Table 50: Deemed to comply requirements for lifts and escalators

Ref	Requirements for lifts and escalators
1	Undertake a transport analysis to determine the number and size of lifts, escalators or moving walkways that are needed to meet the expected transport demand and usage patterns has been determined and minimised.
2a	For lifts, the energy consumption for a standard system and the actual system have been estimated in accordance with ISO 25745 Energy performance of lifts, escalators and moving walks: — Part 2: Energy calculation and classification for lifts (elevators).
2b	For escalators and moving walkways, the energy consumption for a standard system and the actual system have been estimated in accordance with ISO 25745 Energy performance of lifts, escalators and moving walks: — Part 3: Energy calculation and classification for escalators and moving walks.
3a	The lifts have achieved energy efficiency class A under ISO 25745. OR The following measures are incorporated into the lifts where applicable: 1. Regenerative drives. 2. The lifts operate in a standby condition when the lift has been idle for a prescribed length of time. 3. All lift car lighting, digital signage, and electronic displays have an efficiency of ≥ 70 lamp lumens per circuit watt. 4. Drive controllers capable of variable speed, variable-voltage, and variable-frequency (VVVF) control of the drive motor or, other type of drive providing equivalent optimal energy efficiency.
3b	The escalators or moving walkways have achieved energy efficiency class A+++ under ISO 25745. OR The following measures are incorporated into the escalators or moving walkways where applicable: 1. Load sensing devices that synchronise motor output to passenger demand through a variable speed drive, with an inverter operating full-time to moderate output based on passenger demand. OR 2. Passenger sensing devices for automated operation (auto walk), so the escalator operates in standby

Ref	Requirements for lifts and escalators
	mode when there is no passenger demand.
4	When following the "measures" route for 3a or 3b, a suitably qualified member of the project team must confirm the measures have been included in the specification or justify why they are not applicable. For example, because it not technically feasible, or because the additional cost or impact on embodied carbon is unlikely to pay back over the lifetime of the system.

M4.2.4: Swimming pools

The deemed to comply requirements for swimming pools are set out in Table 51 below.

All relevant requirements must be met for the system to be deemed energy efficient.

Table 51: Deemed to comply requirements for swimming pools

Ref	Requirements for swimming pools
1	Pool pumps must have variable speed drives.
2	Pool heating systems must be energy efficient, for example using heat pumps or heat from on-site renewable energy sources.
3	Automatic or semi-automatic pool covers, or 'liquid' pool covers with an automatic dosing system, are fitted to entire pool surface area for ALL pools, including spa pools and hot tubs (if relevant).
4	The air temperature in the pool hall can be controlled so that it is 1°C above the water temperature.

M4.2.5: Commercial laundries

The deemed to comply requirements for commercial laundries which include commercial sized appliances are set out in Table 52 below.

All relevant requirements must be met for the system to be deemed energy efficient.

Table 52: Deemed to comply requirements for commercial laundries

Ref	Requirements for commercial laundries
1	Heat recovery from waste-water is fitted to all appliances.
2	Greywater is used for part of the washing process. This may be recycled from the final rinse and used for the next pre-wash.

M4.2.6: Cooling systems in server rooms

The deemed to comply requirements for cooling servers in server rooms are set in Table 53 below.

All relevant requirements must be met for the system to be deemed energy efficient.

Table 53: Deemed to comply requirements for cooling systems in server rooms

Ref	Requirements for cooling systems in server rooms
1	Cooling is provided by natural or forced ventilation. Active cooling may only be used when the internal temperature cooling in server rooms is designed to meet the widest allowable operating conditions as defined in the ASHRAE temperature classes (or local / national equivalent) to minimise cooling loads. These operating conditions must consider the type of servers which will be installed, and how they will be operated. A suitably qualified specialist justifies the operating conditions which are the most suitable.
2	There is a mechanism to achieve automatic power down of systems when not in use, including overnight.

M5: Determining the number of credits achieved

The total annual energy consumption of in-scope systems is determined based on the estimated energy consumption data entered in the BREEAM Platform, as described in M2.

Where systems are demonstrated to be energy efficient in accordance with M4 this should be indicated in the BREEAM Platform.

The number of credits achieved is calculated in the BREEAM Platform as follows:

$$\frac{\textit{Annual energy consumption by in} - \textit{scope systems that are energy efficient}}{\textit{Annual energy consumption from in} - \textit{scope systems}} \times \textit{Number of credits available}$$

Partial credits are rounded to the nearest whole number.

Compliance notes

Ref	Terms	Description
CN1	Design team lacks relevant specialist knowledge	Where the design team lack the relevant specialist knowledge, calculations and analysis may be carried out by specialist contractors, manufacturers, suppliers, or installers. The assessor must be satisfied that the analysis has been carried out correctly and compliant evidence is provided.
CN2	Refurbishing part of an existing building	Where only part of an existing building is being refurbished and there is cold storage that will serve both the refurbished part and the unchanged part of the building, then this plant is within the scope of this issue and must meet the criteria in order to achieve any available credits.
CN3	Existing lift shaft retained	Where existing lift shafts are being retained, with a new lift system installed, all criteria for this issue can still be assessed and credits awarded accordingly, despite the limitations of the existing shafts. The transport analysis should still be carried out as this will inform the developer of any shortfall in capacity and may influence the design of the new lift system.
CN4	Extending a lift shaft	Where the scope of works regarding a lift only includes extending the lift shaft to other floors, then assessment of this lift is not appropriate. Where changes are made to the lift system, then assessment is required.
CN5	External lighting inside a wider building	'External lighting' that is inside of the wider building, for example a retail unit within a shopping centre, the lighting is external of the retail unit itself but inside of the wider shopping centre, criteria relating to the luminous efficacy should be applied as presented within the manual. For the criteria relating to controlled for prevention of operation during daylight hours and presence detection in areas of intermittent pedestrian traffic, however, instead of demonstrating that the lighting is not operational during daylight hours, it should be demonstrated that the lighting is not operational outside of the operational hours of the wider shopping centre.
CN6	Night-time operation – requirement for controls	Projects or areas of an asset which operate at night-time can adapt or omit the requirement to provide controls or presence detection to align with the building's hours of operation. This could, for example, include service yards or car parks.
CN7	Scope of the criteria for lifts – small service lifts (dumbwaiters)	Small service lifts, of the type typically used to transport prepared food and crockery in restaurants (sometimes referred to as 'dumbwaiters'), fall outside the scope of this assessment issue.
CN8	Presence detection – illuminated signs	The requirements for presence detection do not apply to illuminated signs.

Evidence

Criteria	Interim design stage	Final post-construction stage
1	Documentation or correspondence identifying the unregulated energy using systems that are included within the project specification. Where systems with low annual energy	Updated documentation or correspondence identifying the unregulated energy using systems that are included within the project specification, assessor site inspection report, photographic evidence or other documentary

Criteria	Interim design stage	Final post-construction stage
	consumptions have been excluded from the scope due to the cost of replacement, this must be stated and justified.	evidence to verify the unregulated energy using systems that have been installed. Where systems with low annual energy consumptions have been excluded from the scope due to the cost of replacement, this must be stated and justified.
2	Calculations to show the estimated energy consumption by each in-scope system.	Updated calculations to account for any changes to the building specification.
3	Where not automatically calculated from Ene 02, supporting data to confirm regulated energy consumption values.	No further actions required post-construction; no additional evidence is required other than that listed for the design stage.
4	Where compliance is demonstrated by comparison to a standard version of the system acceptable evidence sources include: — Written justification for the selection and benchmarking of the standard product based on reasonable assumptions or basic market research. — Specific clauses from reports or manufacturer literature relating to the energy efficiency of the specified actual system. — Design drawings. — Specific clauses from reports or manufacturer's literature relating to the energy performance of the standard product. Plus: — Calculations showing that the actual system is more energy efficiency than a standard system. Where a percentage reduction in energy consumption has been accepted as signifying a meaningful reduction in energy consumption, then this should be stated and justified. Where this is demonstrated by meeting the deemed to comply route as set out within M4.2, acceptable evidence sources are listed for each system type in the following rows.	Where compliance is demonstrated by comparison to a standard version of the system acceptable evidence sources include: — Manufacturer's literature relating to the energy efficiency of the actual installed system. — Final construction drawings or equivalent, Assessor site inspection report and photographic evidence or proof of purchase to verify installed products or systems. Plus: — Calculations showing that the actual system is more energy efficiency than a standard system. Where a percentage reduction in energy consumption has been accepted as signifying a meaningful reduction in energy consumption, then this should be stated and justified. Where this is demonstrated by meeting the deemed to comply route as set out within M4.2, acceptable evidence sources are listed for each system type in the following rows.
	External lighting	
	Relevant section of the building specification or contract clauses. OR Where available, design drawings such as external lighting layout or luminaire schedules. Where products are specified, manufacturer's literature for the proposed luminaires and calculations to show average initial luminous efficacy.	Assessor site inspection report and photographic evidence. Final construction or equivalent external lighting layout drawings or luminaire schedules. Manufacturer's literature for the installed luminaires and calculations to show average initial luminous efficacy.
	Cold storage	
	Design drawings, relevant section of the	Final construction drawings or equivalent and

Criteria	Interim design stage	Final post-construction stage
	building specification or contract clauses. Where specific systems are specified: Evidence of the ETL listing for the specific product or evidence to show they are on equivalent list.	assessor site inspection report and photographic evidence. Evidence of the ETL listing for the specific product or evidence to show they are on equivalent list. Refrigeration plant commissioning record.
	Lifts and escalators	
	Transport analysis. Energy consumption calculations. Relevant section of the building specification or contract clauses confirming energy efficient measures. Where specified, manufacturer's product specifications.	Final construction drawings or equivalent and assessor site inspection report and photographic evidence. Manufacturer's product data.
	Swimming pools	
	Relevant section of the building specification or contract clauses. Where products are specified, manufacturer's product data.	Final construction drawings or equivalent and assessor site inspection report and photographic evidence. Manufacturer's product data. Confirmation of room and pool temperatures.
	Commercial laundries	
	Relevant section of the building specification or contract clauses. Where products are specified, manufacturer's product data.	Final construction drawings or equivalent and assessor site inspection report and photographic evidence confirming installed systems. Manufacturer's technical data on the installed systems to demonstrate they are compliant.
	Cooling systems in server rooms	
	Relevant section of the building specification or contract clauses. Confirmation from a suitably qualified specialist of the most suitable operating conditions.	Final construction drawings or equivalent and technical data on the installed systems to demonstrate they are compliant.

Definitions

Energy using equipment

A standalone item of machinery that can perform its intended function without additional components or controls.

Energy using equipment is assessed in Ene 05.

Energy using system

Machinery that consists of multiple components that must be connected and configured to perform its intended function.

Energy using systems are assessed in this issue (Ene 06).

Regulated energy

Building energy consumption resulting from the specification of fixed building services and fittings, including space heating and cooling, hot water, ventilation, fans, pumps and lighting that are generally controlled through the applicable building regulations and are included in the scope of the Ene 01 assessment.

Unregulated energy

Building energy consumption resulting from building services and fittings that are not generally covered by building regulations and are not included in the scope of the Ene 01 assessments.

Additional information

Worked example of credits available and credits awarded

In-scope systems are a commercial scale laundry, a swimming pool, and lifts.

Regulated energy consumption is 110 MWh per year.

The estimated energy consumption for in-scope systems is estimated to be:

- Commercial scale laundry: 3 MWh per year
- Swimming pool: 20 MWh per year
- Lifts: 15 MWh per year

$$\frac{\textit{Unregulated energy use}}{\textit{Regulated energy use}} = \frac{38}{110} \times 100 = 34.54\% = 4\ \textit{credits available}$$

The swimming pool and the commercial scale laundry meet the energy efficiency system requirements, but the lifts do not.

Percentage of energy consumption for in-scope systems that meet the requirements is:

$$\left(\frac{3+20}{3+20+15}\right) \times 100 = 60.52\%$$

0.6052 × 4 = 2.42 = 2 credits achieved (out of 4 credits available)

Note that this calculation procedure is provided for information only. The credits available and awarded will be determined within the BREEAM Platform based on data entered into the system.

Exclusion of laboratory systems from this issue

Laboratory systems are classed as industrial processes and are no longer included for BREEAM Refurbishment and Fit Out assessments.

Ene 07 Flexible demand response

(all buildings)

Aim

This issue recognises installed battery storage and rewards electrical building systems which have the capability to automatically modify their electricity consumption patterns in response to signals from the electricity supplier. This allows consumption patterns to be aligned with the availability of renewable energy and so reduce carbon emissions from grid supply electricity.

Overview

Assessment type	Credits available	Minimum standards	Applicable assessment criteria
Part 1: Fabric and structure	0	None	Not applicable
Part 2: Core services	up to 2	None	All
Part 3: Local services	up to 2	None	All
Part 4: Interior design	0	None	Not applicable

Assessment type specific notes

Ref	Assessment type specific note
-	None

Building type specific notes

Ref	Building type specific note
-	None

Assessment criteria

Up to two credits – Flexible demand response

1 Identify electrical systems within the scope of the assessment and determine their flexible demand response capability.

2 The number of credits awarded is based on the number of credits available and the percentage of flexible demand response points awarded (see Table 54).

Table 54: Number of credits awarded

Points awarded	1 credit available	2 credits available
≥ 1% of available points	1 credit awarded	1 credit awarded
> 33% of available points	1 credit awarded	2 credits awarded

Methodology

M1: Flexible demand response

For Part 2, electrical systems situated in common areas or providing services to all areas of the building must be included in the scope of the assessment.

For Part 3, electrical systems serving separate functional areas or separately tenanted areas must be included in the scope of the assessment.

EV charging points are assigned to Part 2 or Part 3 based on whether the EV charging point users are available to occupiers and visitors to separate functional areas or separately tenanted areas only, in which case they must be included for Part 2 assessments. Otherwise, they should be assessed under Part 3.

All in-scope electrical systems that are newly installed, refurbished, or existing must be included for this issue.

The number of credits available is determined by the number of flexible demand response points available for all in-scope systems (see Table 55).

Table 55: Number of credits available

Number of flexible demand response points available	Number of credits available
0	0
1–3	1
> 3	2

The percentage of flexible demand response points awarded is calculated as follows:

$$\frac{Number\ of\ flexible\ demand\ response\ points\ awarded}{Number\ of\ flexible\ demand\ response\ points\ available} \times 100$$

where:

The number of flexible demand response points available is determined by the in-scope electrical systems (see Table 56).

The number of points awarded is determined by the flexible demand response capability of each in-scope system (see Table 56).

Table 56: Flexible demand side response points available and points awarded

Systems present	Points available	Flexible demand capability	Points awarded
Electric space heating	1	Operation can be optimised based on signals from the electricity supplier or local renewable sources.	1
Electric space cooling	1	Operation can be optimised based on signals from the electricity supplier or local renewable sources.	1
Electric domestic hot water	1	Operation can be optimised based on signals from the electricity supplier or local renewable sources.	1
Electric vehicle charging points	2	Charging with **one-way control** based on signals from the electricity supplier or local renewable sources.	1
		Charging with **two-way control** based on signals from the electricity supplier or local renewable sources.	2
Other systems or equipment with flexible demand capability	1	Installed.	1
Battery energy storage	3	Installed battery energy storage with no flexible demand response capability.	1
		The installed battery energy storage system is only capable of charging based on signals from the electricity supplier or local renewable sources.	2
		The installed battery energy storage system is only capable of feeding electricity back into the grid.	2
		The installed battery energy storage system is capable of both charging and feeding electricity back into the grid, based on signals from the electricity supplier or local renewable source.	3

The types of electrical systems within the scope of the assessment and their flexible demand response capabilities must be entered in the BREEAM Platform. This will calculate the number of points available and awarded and hence the number of credits available and awarded.

Compliance notes

None.

Evidence

Criteria	Interim design stage	Final post-construction stage
All	For new systems: Design drawings, relevant section or clauses of the building specification or contract. Where products are specified, manufacturer's product details confirming the flexible demand capability of specified systems. For existing systems: assessor site inspection report and photographic evidence showing installed systems. Manufacturer's technical data confirming the flexible demand capability of the installed systems	Final construction drawings or equivalent or assessor site inspection report and photographic evidence showing installed systems. Manufacturer's technical data confirming the flexible demand capability of the installed systems.

Definitions

One-way control

Flexibility demand response capability for electric vehicle chargers that allows the vehicle battery to be charged by the grid based on signals from the electricity supplier or local renewable sources.

Two-way control

Flexibility demand response capability for electric vehicle chargers that allows the vehicle battery to be charged and discharged back into the grid based on signals from the electricity supplier or local renewable sources.

Additional information

Worked example of credits available and credits awarded

A building has electric heating and cooling systems with no flexible demand response and EV charging points with one-way control based on signals from the electricity supplier.

Step 1

Refer to Table 56 to determine the relevant electrical systems present, the number of flexible demand response points available, and the number of points scored:

- Electric space heating system – 1 point available – 0 points scored
- Electric domestic hot water – 1 point available – 0 points scored
- Electric vehicle charging point – 2 points available – 1 point scored

Total points available = 4

Total points scored = 1

Step 2

Refer to Table 55 to determine how many credits are available based on the number of points available:

Total points available = 4

Number of credits available = 2

Step 3

Refer to Table 54 to determine the number of credits awarded:

1 of 4 available points scored = 25%

Number of credits achieved = 1

Note that this calculation procedure is provided for information only. The credits available and awarded will be determined within the BREEAM Platform based on data entered into the system.

Ene 08 Installed controls

(all buildings)

Aim

To encourage the installation of controls that facilitate energy efficient operation of HVAC systems in use.

Overview

Assessment type	Credits available	Minimum standards	Applicable assessment criteria
Part 1: Fabric and structure	0	None	Not applicable
Part 2: Core services	up to 2	None	All (see ref 3.0 and 3.1)
Part 3: Local services	up to 2	None	All (see ref 3.0 and 3.1)
Part 4: Interior design	0	None	Not applicable

Assessment type specific notes

Ref	Assessment type specific note
-	None

Building type specific notes

Ref	Building type specific note
-	None

Issue specific notes

Ref	Issue specific note
3.0	This issue will be filtered out for refurbishment assessment areas which have no space heating, no space cooling and no mechanical ventilation.
3.1	This issue may be filtered out where the building has separate local building services for space heating, space cooling and/or mechanical ventilation AND where the occupants or an onsite facilities manager will be able to effectively control HVAC systems manually.

Assessment criteria

Up to two credits – Installed controls

1 Determine the number of installed controls points available based on the in-scope HVAC services installed and the relevant system details.

2 Determine the number of installed controls points achieved based on the functionality of the controls.

3 The number of credits awarded is determined by the proportion of available installed controls points that are achieved (see Table 57 on the next page and M1).

Table 57: Credits for installed controls

Percentage of available installed control points achieved	Number of credits
< 33%	0
≥ 33%	1
≥ 66%	2

Methodology

M1: Installed controls

For Part 2, all HVAC services serving common areas plus centralised services provided to all areas of the building must be included in the scope of the assessment. For Part 3, any local HVAC systems serving separate functional areas or separately tenanted areas must be included in the scope of the assessment.

All in-scope HVAC systems must be included for this issue.

Identify which of the following services from space heating, space cooling, and mechanical ventilation is included in the assessment.

Where no systems that provide space heating or space cooling or centralised mechanical ventilation are included in the scope of the refurbishment, this issue will be filtered out.

For each in-scope building services system, identify system characteristics to determine the number of installed control points available.

Where different in-scope HVAC systems provide the same buildings service to different areas of the building, the characteristics for the system that serves the highest proportion of the building's floor area must be assessed.

Back-up servicing systems that are only used when the main servicing systems are out of action are not considered under this issue.

Identify the functionality of installed controls that are relevant for in-scope systems of all in-scope installed systems to determine the number of installed control points awarded.

Where the system has more than one of the listed control functionalities, select the option that achieves the most points.

The number of credits awarded is determined by the percentage of available points that are achieved which is calculated as follows:

$$\frac{Number\ of\ installed\ control\ points\ achieved}{Number\ of\ installed\ control\ points\ available} \times 100$$

The number of points available and awarded are calculated within the BREEAM Platform based on the answers to questions about the in-scope installed HVAC system(s) and functionality of the installed controls as shown in Table 58, Table 59, Table 60, and Table 61.

Table 58: Installed controls (space heating systems) – points available and awarded

Building service	System type	Points available	Control type	Control functionality	Points awarded
Space heating	Any	4	Room level heating output – all heat generators	Heating output controlled at the room/zone level	1
				Heating output controlled at the room/zone level with communication between the room controllers and the building control system, for occupied areas this may be achieved via occupancy detection	2
			AND		
			Heat generator output – heat	Multi-stage control (e.g., several on/off compressors)	1

Building service	System type	Points available	Control type	Control functionality	Points awarded
			pumps	Variable control (e.g., hot gas bypass, inverter frequency control)	2
			OR		
			Heat generator output – other types of heat generator	Outside temperature sensor	1
				Load, for example supply water temperature set point	2
	Systems with a heat distribution medium (e.g., air or water)	3	Heat distribution temperature	Outside temperature sensor	1
				Indoor temperature sensor	2
			Variable speed control of pumps and/or fans	Present	1
	Systems with more than one heat generator	2	Sequencing of heat generators	Generators operate in a fixed priority order	1
				Generators operate in a dynamic priority order	2

Table 59: Installed controls (space cooling systems) – points available and awarded

Building service	System type	Points available	Control type	Control functionality	Points awarded
Space cooling	Any	2	Room level cooling output	Cooling output controlled at the room/zone level	1
				Cooling output controlled at the room/zone level with communication between the room controllers and the building control system and or occupancy detection	2
		2	Cooling generator output	Multi-stage control (e.g., several on/off compressors)	1
				Variable control (e.g., hot gas bypass, inverter frequency control)	2
	Systems with a coolth distribution medium (e.g., air or water)	3	Cooling distribution temperature	Outside temperature sensor	1
				Cooling demand sensor	2
			Variable speed control of pumps and/or fans	Present	1
	Systems with more than one generation	2	Sequencing of cooling generators	Fixed priority order	1
				Dynamic priority order	2

Table 60: Installed controls (both heating and cooling systems supplying the same area) – points available and awarded

Building service	Points available	Control type	Control functionality	Points awarded
Heating and cooling supplied to the same areas	2	Interlock controls	Partial interlock	1
			Full interlock	2

Table 61: Installed controls (mechanical ventilation systems) – points available and awarded

Building service	System type	Points available	Control type	Control functionality	Points awarded
Mechanical ventilation	Any	5	Control of ventilation output at room level	Air flow controlled by occupancy detection	1
				Air flow controlled centrally based on air quality sensors	2
				Local air flow control based on air quality sensors	3
			Control of air handling unit output	Multistage controller	1
				Automatic flow or pressure control where load depends on the air flow demand for all connected rooms	2
	Systems in buildings with space heating	2	Heat recovery	Heat recovery controlled by sensors in the exhaust air	1
				Heat recovery controlled by multiple room temperature sensors or predictive control	2
	Systems in buildings with cooling	2	Free cooling	Air flows always modulated to minimise mechanical cooling	1
				Air flow modulated to minimise mechanical cooling based on temperature and humidity	2

Compliance notes

None.

Evidence

Criteria	Interim design stage	Final post-construction stage
All	For new systems: Relevant section or clauses of the building specification, contract or technical manuals and photographic evidence confirming the HVAC systems and installed controls specified to support the answers entered within the BREEAM Platform. For existing systems: Assessor site inspection report and photographic evidence showing installed control. Manufacturer's technical data confirming the capability of the installed controls.	Final construction drawings or equivalent, assessor site inspection report and photographic evidence, technical data sheets, invoices or other robust post-construction documentation confirming the installed HVAC systems and control functionality to support the answers entered within the BREEAM Platform.

Definitions

Air handling unit (AHU)

Air handling units are used to distribute conditioned air around the building via ductwork. They usually contain filters to clean the air and heating and/or cooling coils to control the air temperature.

Free cooling

The use of low temperature outside air to reduce the indoor air temperature to reduce the demand for mechanical cooling.

Heat recovery

A mechanical ventilation system that is fitted with a heat exchanger. The heat exchanger extracts heat from exhaust air and uses it to preheat incoming air to reduce the demand for heating.

Interlock control

A control that switches off the heating generator, and any associated pumps, when there is no demand for heating and switches off the cooling generator, and any associated pumps, when there is no demand for cooling.

Partial interlock

Heating and cooling interlock controls are separate but can be set up to minimise the possibility of simultaneous heating and cooling.

Full interlock

Heating and cooling interlock control is connected so that simultaneous supply of heating and cooling is not possible.

Additional information

None.

Transport



Summary

This category encourages better access to sustainable means of transport for building users. Issues in this section focus on the accessibility of public transport and other alternative transport solutions (cyclist facilities, provision of amenities local to a building) that support reductions in car journeys and, therefore, congestion and CO_2 emissions over the life of the building.

Assessment issues

Tra 01 Transport assessment and travel plan	2 credits
Tra 02 Sustainable transport measures	8 credits

Tra 01 Transport assessment and travel plan

(all buildings)

Aim

To enhance awareness of existing local transport and identify opportunities for sustainable transport improvements.

Overview

Assessment type	Credits available	Minimum standards	Applicable assessment criteria
Part 1: Fabric and structure	2	None	All
Part 2: Core services	2	None	All
Part 3: Local services	2	None	All
Part 4: Interior design	2	None	All

Assessment type specific notes

Ref	Assessment type specific note
-	None

Building type specific notes

Ref	Building type specific note
-	None

Assessment criteria

Two credits – Transport assessment and travel plan

1 Conduct a site-specific transport assessment by the end of the Concept Design stage; see M1.

2 Develop a site-specific travel plan following the transport assessment recommendations by the end of the Concept Design stage; see M3.

3 Demonstrate that the travel plan can guide the appropriate implementation of sustainable transport measures during the design, construction, and occupancy stages and be supported by the building's management during operation.

Methodology

M1: Transport assessment

Compliance with criterion 1 can be achieved by either a transport assessment or a transport statement, depending on the expected impact of the project:

a. **Transport assessment:** a comprehensive evaluation is required where the project is expected to impact the transport network significantly. This is generally where there will be a change of use, e.g. from an office to a hotel.

b. **Transport statement:** a less detailed report suitable when the project is expected to have limited impact and will implement minimal sustainable transport measures from Tra 02.

The transport assessment or statement must cover the following elements as a minimum:

1. **Development description:** An overview of the project, including its size, type, location, and intended use.
2. **Existing transport infrastructure:** An analysis of current transport infrastructure and services to identify relevant constraints and opportunities. This must include the travel patterns of existing building users in relation to:
    a. Walking infrastructure: sidewalks, paths and crossings.
    b. Cycle infrastructure: cycling lanes and cycle parking.
    c. Public transport: the site's connectivity to public transport services.
3. **Inclusive design:** Evaluation of transport infrastructure for people with disabilities, such as mobility, visual, and age-related requirements.
4. **Accessible amenities:** The number and type of existing accessible amenities within 500 m of the site. The distance to an amenity must be measured via a safe pedestrian route from the main building entrance. See Definitions and Table 62.
5. **Public Transport Accessibility Index (PTAI):** Calculate the existing PTAI, see M2.
6. **Future travel patterns:** Predicted travel patterns and transport impacts of future building or site users.
7. **Stakeholder engagement:** Consultation with local authorities, building users, and the surrounding community to ensure the travel plan aligns with local needs.

When certain elements may not be applicable or relevant, a brief justification can be provided for each consideration, explaining why it is not relevant to the project's scope or scale.

For further guidance on transport assessment and travel plans, it is essential to consult the relevant local transportation authorities, as regulations and guidelines can vary at federal, state, national, and local levels.

Table 62: Amenities in proximity to the site

Amenities
Appropriate food outlet
Access to an ATM (cash)
Access to a suitable outdoor open space
Access to a recreation or leisure facility for fitness or sports
Publicly available postal facility
Community facility
Dispensing pharmacy
Public sector doctor's surgery or general medical centre
Childcare facility or school

M2: Public Transport Accessibility Index (PTAI)

The Public Transport Accessibility Index (PTAI) is calculated as part of the transport assessment. Its value relates to the site location and informs transport-related design decisions. The PTAI must be based on current information, including any planned and publicly notified changes during the transport assessment, and should be used as the benchmark for the assessment.

Where unforeseen changes to public transport availability are later implemented before post-construction certification, the PTAI should not be updated at the post-construction stage.

M2.1: Calculating the PTAI

Enter the following information into the BREEAM Platform to determine the PTAI of the assessed building:

1. Public transport type (bus, rail, tube/metro, tram, other services).
2. Distance (m) from the main building entrance to each compliant public transport node.
3. Average number of services per hour at each node during the building's operating hours.

Compliant public transport node criteria:

a. A bus stop within 650 m or a railway station (or other transport service) within 1000 m of the main entrance, measured via a safe pedestrian route.

b. The service must connect to an urban centre, major transport node, or community focal point (e.g., school, library, doctor's surgery).

c. Only local services are assessed; national services are excluded unless they function as local commuter routes.

M2.2: Calculating the average number of services for PTAI

Follow the steps below to calculate the average number of services:

1. For each public transport node (e.g., bus stop, train station), count the total number of services stopping during the identified operating hours.
2. Determine the building's operating hours: Identify the building's peak arrival and departure times or its typical daily operating hours (e.g., 08:00–19:00, a total of 11 hours). If the building operates 24/7 or the hours are unknown, use Table 63 below.
3. Calculate the average number of services per hour: Divide the total number of stopping services by the total operating hours.
4. Repeat this calculation for each public transport node associated with the assessment project

Example calculation

— Operating hours: 08:00–19:00 (11 hours)

— Stopping services: 35 services during this period

— Average services per hour: 35/11 = 3.2 services per hour

Table 63: Default hours of operation by building type for a typical day

Building type	Default hours
Education: Preschool, school, sixth form college	07:30–10:00, 15:00–17:30
Education: Further education and higher education institutions	08:00–19:00
Healthcare	07:00–20:00 (encompassing visiting hours and the typical daytime shift pattern)
Retail: Shopping centre	09:00–19:00
Retail: Supermarket	08:00–22:00
Retail: Retail services	08:00–18:00
Retail: Convenience store	07:00–22:00
Retail: Retail park or warehouse	08:00–20:00
Retail: Retail store	08:30–17:30
Residential	08:00–19:00
Government services: Law court	08:00–19:00
Prison (UK only)	07:00–20:00 (encompassing visiting hours and the typical daytime shift pattern)
Other	08:00–19:00 *Or use any of the above hours, as appropriate to the building type.*
24-hour building	07:00–20:00

M2.3: On-demand public bus services

Demand-based bus services operated by public transport providers can be included in the PTAI calculation. The project team must determine an average number of stops per hour to allow input into the BREEAM Platform.

These can be recognised as follows:

- The location of the transport node should be determined as the nearest available pick-up point to the assessed building.
- The frequency of the service should be considered as the published maximum wait time (or actual average wait time if the service is established and this data is available).
- Such services, while serving multiple destinations, should be considered as a single route.
- It must be demonstrated that information on the availability and how to access the service is made available to building users.

This is limited to on-demand bus services, which are operated as public transport with multiple pick-up and drop-off points. It does not extend to private hire, taxis, or other similar operations.

M2.4: Multiple services

Services that operate from more than one node within proximity of the building must be considered only once, at the node closest to the building. Different services at the same node count as separate services.

M2.5: Bi-directional routes

Routes may be bi-directional; however, for the purpose of calculating the index, consider only the direction with the highest frequency.

M3: Travel plan measures

A travel plan should demonstrate how the transport assessment has influenced its development, outlining the specific outcomes, targets, and measures required, and setting out plans for future monitoring and management. It guides the implementation of sustainable transport measures during the design, construction, and occupancy stages. It is also intended to be a live document adopted by building management to support an ongoing sustainable transport strategy.

Key considerations
When developing the travel plan, the following considerations must be addressed at a minimum:

1. Engaging with local authorities, building users, and the surrounding community to ensure the travel plan aligns with local needs.
2. Considering all types of users, ensuring equitable access and inclusivity.
3. Negotiating with public transport companies to increase the local service for the development.
4. Providing a public transport information system in a publicly accessible area.
5. Providing electric vehicle charging infrastructure.
6. Providing priority parking spaces for car sharers.
7. Designating priority parking spaces for individuals with disabilities.
8. Reducing parking spaces or implementing parking charges.
9. Consulting with the local authority on the state of, and improvements to, the local cycling network.
10. Providing a pedestrian and cyclist-friendly environment. This includes providing:
    a. Cycle lanes.
    b. Safe crossing points.
    c. Direct routes.
    d. Appropriate tactile surfaces.
    e. Landscaping and shelter for public transport waiting areas.
    f. Good lighting, signposting to other amenities, public transport nodes, and adjoining off-site pedestrian and cycle routes.
11. Providing dedicated and convenient cycle storage.
12. Providing cyclists' facilities.
13. Identifying existing amenities and assessing potential enhancements.
14. Providing suitable taxi drop-off or waiting areas.
15. Ensuring rural buildings have appropriate access to transport to serve the local community adequately.

Consider the following scenarios regarding the building occupiers:

Building occupier is known

- Confirm that the building occupier has been actively involved in developing the travel plan.
- Ensure that the building owner agrees to implement the travel plan to support their transport strategy.

Building occupier is unknown

- A travel plan is still required, even if the end-user or occupier is unknown.
- The developer must confirm that the travel plan will be handed over to the building owner or future occupier.
- Include provisions in the handover documentation to ensure the travel plan can be implemented by the future occupier (e.g. responsibilities, required measures, and review arrangements).

When certain measures may not be applicable or relevant, a brief justification can be provided for each consideration, explaining why it is not relevant to the project's scope or scale.

Evidence of the implementation of specific travel plan measures is not required for Tra 01 (this is addressed under Tra 02).

Compliance notes

Ref	Terms	Description
CN1	Transport assessment included in the travel plan	The transport assessment can be incorporated into the travel plan instead of a separate report. Relevant information must be distinctly identified between the transport assessment and the travel plan document. The travel plan must effectively showcase how the transport/travel assessment has informed the strategic elements of the plan.
CN2	Travel plan – Existing travel plan	An up-to-date organisational travel plan can be used to demonstrate compliance, provided it meets the requirements of M3. The plan must cover all building users of the assessed building and account for any additional travel generated.
CN3	Accessible amenities and PTAI – Main building entrance to consider for campus-style developments	When 80% or more of the buildings within a site are located within 1 km of the site entrance, this entrance may be used to determine the distance to an accessible amenity or compliant node. When less than 80% of the buildings are within 1 km of the site entrance, the assessed building's main entrance must be used as the reference point to determine the distance to an accessible amenity or compliant node. This reflects that in large sites, where distances may be too great to be comfortably covered on foot, the needs of building users are better served by locating public transport nodes within or on the edge of the site. Where the assessed building has multiple main entrances, the most convenient main entrance can be used for the calculation. For stand-alone buildings not located within a large site, the building's main entrance must always be used as the reference point.
CN4	PTAI – Community transport schemes in rural areas	In rural areas, where scheduled public services may be limited, community transport schemes, including 'on-demand services', should be noted in the 'Transport assessment and travel plan'; however, unscheduled services cannot be accounted for when calculating the PTAI.
CN5	PTAI – Future transport nodes	Where a transport node is currently inactive but will become active soon after project completion, it can be included when calculating the existing PTAI. To demonstrate this, the appropriate public transport authority or company must confirm the start of service date and frequency.
CN6	PTAI – Park and Ride services	Park-and-ride bus services run from one or more car parks to a city centre or other destination. They allow travellers to park their cars at a convenient location and complete their journey by bus. These generally stop at transport nodes *en route* to allow passengers to board or alight. In such cases, where appropriate, this can be considered as contributing to the PTAI.

Evidence

Criteria	Interim design stage	Final post-construction stage
1	A copy of the transport assessment or statement.	No further actions required post-construction; no additional evidence is required other than

Criteria	Interim design stage	Final post-construction stage
	Justification of why transport statement was chosen over transport assessment (if applicable).	that listed for the design stage.
	Submit the PTAI calculation inputs to the BREEAM Platform. — Scale map highlighting the location of the building and all public transport nodes in the proximity of the building via a safe pedestrian route; updated digital sources such as online mapping services may be used. — Timetables for each service at each public transport node. — Calculations to show average services per hour for each node. — When applicable, information about the on-demand bus service. To-scale maps or drawings to show the location and type of key local amenities present and their distance from the assessed development via a safe pedestrian route; digital sources such as online mapping services may be used.	When web-based maps are outdated, the Assessor's site inspection and photographic evidence are needed to confirm: — Location of public transport nodes. — Location of key local amenities. — Key areas of safe pedestrian route.
2	A copy of the travel plan.	No further actions required post-construction; no additional evidence is required other than that listed for the design stage.
2, 3	Where the building occupier is known, documentation confirming the building occupier's involvement in the travel plan. Where the building user is not known, documentation confirming that the travel plan will be handed by the developer to the building owner.	Written agreement from the building owner to implement the travel plan to support their transport strategy. Handover documentation to ensure the travel plan's future implementation.

Definitions

Accessible amenities

Amenities are accessible via safe pedestrian routes. All listed amenities must be open during typical working hours for the asset type and when employees benefit from them.

— **Appropriate food outlet:** a fixed asset that caters to the day-to-day needs of most building users — for example, a café, take-away, restaurant or food shop. A vending machine can qualify as a food outlet if it consistently offers a variety of items that reasonably meet the needs of building users and is confirmed to be a permanent fixture. A food truck or mobile catering service would not be sufficient to meet the criteria for this issue.

— **Access to an ATM (cash):** this refers to the availability and convenience of reaching an Automated Teller Machine (ATM) to access cash. Building users should have access to cash at all relevant times of the day. An ATM inside a building is acceptable as long as its operating hours are convenient for building users.

— **Suitable outdoor open space:** a space that allows building users to sit outside and take a break. This could be an open-air courtyard or external space within the site, a pedestrianised public piazza, or a local park. The space must be

suitably sized for the number of people likely to use it and must not form part of the public highway. Where a compliant outdoor open space also meets the criteria for 'Outside space' in Hea 07, it can be considered under both issues.

- **Recreation or leisure facility:** a building that allows building users to exercise and maintain a healthy lifestyle. Examples include a local leisure centre, tennis courts, or a gym.
- **Publicly available postal facility:** a publicly accessible facility that enables the general public to send postal items. This includes staffed facilities offering postal services, traditional post boxes, and multicarrier smart lockers that support outbound services for multiple independent operators. Single-carrier lockers or collection-only points are excluded.
- **Community facility:** a space facilitating community activities for the assessed building's users. Examples include a community centre or hall, collaborative work areas, recreational zones, shared gardens, or allotments. Note that suitability depends on the building's purpose and the needs of its occupants.
- **Dispensing pharmacy:** an accessible pharmacy that provides prescribed medicines for building users. If services are confirmed, an internal pharmacy within a hospital or an on-site controlled medical dispensary may be acceptable.
- **Public sector doctor's surgery or general medical centre:** a healthcare facility or general medical centre providing general practitioner services and basic medical care to the community.
- **Childcare facility or school:** a dedicated facility or institution that provides child support for potential building users, such as nurseries or schools.

Building users

This can be any of the following, as appropriate to the building type:

1. Staff (commuter journeys and business travel)
2. Pupils and students
3. Visitors
4. Patients
5. Customers
6. Community users
7. Delivery workers, contractors, or service providers who regularly work at or access the building
8. Residents.

Main building entrance

The main building entrance is the entrance to the assessed building, which is directly connected to the main building reception, circulation routes, lifts, or stairs. It is available to most of the building's staff and visitors on arrival. It is not the site entrance (unless the site entrance is also the building entrance, e.g., a building with a boundary on a public highway). In the context of campus-style developments, the site entrance may serve as the building entrance (see CN3 on page 251).

For prison or military site assessments (UK only), the main entrance should be taken as the gatehouse entrance.

Operating hours in a typical day

Operating hours refer to the period during which a building is in use on a typical day. In choosing a typical day, the assessor should check that timetabled information for that day is, within reason, representative of the public transport provision for the entire operating week. In most cases, the building's normal operating hours can be used.

Where shift patterns see most building users (≥ 80%) arriving or leaving during a certain period, that period can be used as an alternative to the operating hours of the building.

For example, this could be an office building where most office workers arrive between 08:00 and 10:00. This accounts for some building types that operate a 24-hour day and on shifts.

During late night hours, when there is little public transport, such periods do not need to be accounted for when assessing this issue.

Public Transport Accessibility Index (PTAI)

An indicator of the accessibility and density of the public transport network at a point of interest (the BREEAM-assessed building). The BREEAM PTAI is adapted from the Public Transport Access Level method. The index is influenced by the proximity and diversity of the public transport network and the frequency of services at the accessible nodes. The greater the

number of compliant nodes, services, and their proximity to the building, the higher the PTAI.

Safe pedestrian route

Safe pedestrian routes include pavements, paths, and safe crossing points. The distance must not be measured in a straight line but along an actual walking route.

Transport assessment

Transport assessments and transport statements evaluate potential transport impacts of development and may propose measures to promote sustainable development. To be effective, they must be carried out during the early design stages to influence time-critical aspects of the design.

Travel plan

A travel plan is a strategy for managing all travel and transport within an organisation. It contains physical and behavioural measures to increase sustainable travel choices to a site or development. It must be developed at the early design stage closely collaborated with, and informed by, a transport assessment or statement.

Additional information

None.

Tra 02 Sustainable transport measures

(all buildings)

Aim

To maximise the potential for people to choose public, active and lower-emission private transport by providing the site with convenient, sustainable options.

Overview

Assessment type	Credits available	Minimum standards	Applicable assessment criteria
Part 1: Fabric and structure	8	None	All
Part 2: Core services	8	None	All
Part 3: Local services	8	None	All
Part 4: Interior design	8	None	All

Assessment type specific notes

Ref	Assessment type specific note
1.0	**Existing transport measures** This issue recognises and awards credits for sustainable transport measures that already exist in the pre-refurbishment building. Where such measures remain in place, functional, and compliant with current criteria, they can be included in the assessment alongside any new or enhanced provisions introduced through the project.

Building type specific notes

Ref	Building type specific note
-	None

Assessment criteria

Prerequisite – Transport assessment and travel plan

1 Complete a transport assessment and travel plan in line with Tra 01. If these documents are completed after Concept Design, they can still be used to meet this prerequisite.

Up to eight credits – Transport options implementation

2 Calculate the credits as follows:

2.a Refer to the score given in the Public Transport Accessibility Index (PTAI) as calculated in Tra 01. This score will be used to weight the points awarded in Tra 02.

2.b Award points where sustainable transport measures are available to the building occupants, including measures newly implemented or already in place as part of the development, in accordance with Table 64 on the next page.

2.c Use Table 65 on page 257 to convert the number of points achieved for sustainable transport measures into credits, as weighted by the PTAI score.

Table 64: Summary of sustainable transport measures and points

Option	Sustainable transport measures	Points
Public transport measures		
1	The existing PTAI calculated as per Tra 01 is worth one point if it is: a. ≥ 4 for prison or military sites (UK only), rural location buildings, and further and higher education buildings. b. ≥ 8 for all other building types.	1
2	Improve the existing PTAI by at least 1.00 – any successful intervention receives the full three points. *For example:* — *Negotiating with local public transport companies to increase service provision for the development.* — *Providing a diverted bus route, a new bus stop, or similar.* — *Providing a dedicated transport service, such as a bus route.*	3
3	Provide up-to-date local public transport information in a convenient, accessible area to help building users plan journeys by public transport.	1
Private transport measures		
4	Provide electric vehicle charging infrastructure, ≥ 7 kW EV charging points and associated cable routes, see M1.	1 or 2
5	a. Set up a car sharing group or facility to promote car sharing among building users. b. Actively market the car sharing scheme and provide communication channels that make it easy to join and use. c. Provide priority spaces for car sharers, allocating ≥ 5% of the total staff car parking capacity. d. Ensure that car share spaces are placed near the building entrance as the requirements of other types of priority parking (disabled, etc.) allow.	1
Active travel measures		
6	a. Engage with the local authority at the earliest (brief) stage to review public cycle and pedestrian routes. b. Agree on possible improvements to the local active travel network that supplement existing plans and are relevant to the site/project. c. Select at least one such improvement and carry it out.	2
7	Install at least the minimum number of cycle storage spaces as set out in Table 69 (see M2).	1
8	Having supplied cycle storage space as per Option 7 above, provide building users with at least two of the following facilities: — Showers — Changing facilities — Lockers — Drying spaces. *Where facilities are combined – e.g. showers and changing facilities – it must be possible for different people to use them at the same time if they are to count as more than one facility.*	1
9	**Existing amenities:** Ensure at least three relevant amenity types within ≤ 500 m of the building entrance (see M4).	1
10	**New additional amenities:** Provide new amenities that are relevant and accessible within ≤ 500 m of the building entrance (see M4).	2 or 3
Alternative transport measures		
11	Carry out one site-specific improvement measure in line with the travel plan not listed as an option in Tra 02. Submit this for BRE review.	1 to 3

Use Table 65 below to calculate how many credits to award for the points achieved from implementing a selection of Options 1–11 in Table 64 above.

Table 65: Credits awarded based on PTAI and the number of points achieved for sustainable transport measures

Number of points achieved for sustainable transport measures			Credits awarded
PTAI < 25	25 ≤ PTAI < 40	PTAI ≥ 40	
1	1		1
2		1	2
3	2		3
4		2	4
5	3		5
6	4	3	6
7	5		7
8 or more	6 or more	4 or more	8

Example

- Options 1, 2, 7 and 8 have been successfully implemented = 1 + 3 + 1 + 1 = 6 points for sustainable transport measures.
- The PTAI score for the site is 30.
- For a site with a PTAI score between 25 and 40, 6 points are worth 8 credits.

Methodology

M1: Electric vehicle charging infrastructure

Option 4 (up to 2 points) from Table 64 on the previous page

- **1 point:** Minimum requirements for EV charging infrastructure have been met (see below).
- **2 points:** Minimum requirements have been met, and the EV charging score is 20 or above, as calculated using all EV charging infrastructure combined (i.e. active and passive). OR, 30% of the total parking spaces must have active EV charging points providing a minimum capacity of 7 kW.

Minimum requirements

EV charging infrastructure requirements apply exclusively to the parking spaces associated with the assessed building. At least 30% of total parking spaces must have EV charging infrastructure comprising:

- **At least 10% active EV charging:** A minimum of 10% of the total parking spaces must have fully operational EV charging points providing a minimum capacity of 7 kW.
- **Remaining 20% as passive EV charging:** The remainder of the 30% requirement must have the necessary infrastructure (e.g., cable routes, electrical supply) to support future demand.

EV charging places must be accessible to all building users. The design team should consider designating a proportion of EV charging spaces to priority parking.

Calculation method

The EV charging score is calculated as follows:

$$EV\ charging\ score = \frac{\sum(PS \times PST)}{TS} \times 100$$

Where:

PS = Provision score (see Table 66 on the next page)

PST = Number of parking spaces with the same provision score

TS = Total number of parking spaces associated with the assessed development

Table 66: Provision score for EV charging infrastructure

Provision	Provision score
Active EV charging infrastructure (≥ 7 kW)	0.5
Active EV charging infrastructure (≥ 22 kW)	1
Passive EV charging infrastructure	0.5

Example calculation

For 2 points:

As stated above, a result of ≥ 20 is needed to achieve the maximum 2 points available for providing EV charging infrastructure. This example shows how a building with 100 parking spaces would achieve a result of 20 using the EV calculation method (see Table 67 and Table 68).

Table 67: Example of the provision score for EV charging infrastructure

Example 1	Qty	% total space allocated
Parking spaces	100	-
Active EV charging infrastructure (≥ 7 kW)	0	0%
Active EV charging infrastructure (≥ 22 kW)	10	10%
Passive EV charging infrastructure	20	20%

Table 68: Example score calculation for EV charging infrastructure

Provision	Calculation	Subtotal
Active EV charging infrastructure (≥ 7 kW)	0 × 0.5 =	0
Active EV charging infrastructure (≥ 22 kW)	10 × 1 =	10
Passive EV charging infrastructure	20 × 0.5 =	10

EV charging score = (20 / 100) × 100 = **20**

The assessed building meets the minimum requirement that 30% of its parking spaces have EV charging infrastructure, comprising at least 10% active and 20% passive EV charging. Therefore, it receives **2 points**.

M1.1: Communal car parking and site-wide campus

Where the assessed building uses a communal car park or is part of a campus:

- The provision for EV charging infrastructure is calculated based solely on the parking spaces (existing and new) associated with the assessed building.
- Where the overall parking area(s) are shared with other buildings, the proportion of communal parking spaces associated with the assessed building should be calculated pro rata. For this calculation, use the building's occupancy relative to the occupancy of the entire site. If occupancy is unknown, use the building's relative floor area.
- The EV charging spaces must be conveniently located near the building and managed to ensure availability for its users.
- Where visitor parking spaces are designated for short-term use only (a maximum of 15 minutes), such as for order collection or drop-off at retail outlets, they can be excluded from the calculation for EV spaces. Other scenarios may be considered where appropriately justified.

M1.2: Phased development

Where phases of a project are assessed at different times:

- Calculations relating to EV charging provision should be based on the spaces associated with the assessed building.
- Pro-rata calculations can include EV infrastructure completed in the current and previous phases, provided it aligns with the phasing plan.
- EV infrastructure from future phases may count if a binding contract ensures delivery, with clear timelines and alignment with the phasing plan.

M1.3: Extensions

Where parking is integrated with the main building:

- EV requirements must be based on the total parking demand associated with the project, including both existing associated spaces and any new spaces created.
- Proportional allocation formula:

  Determine the project's share of the total site parking using either GIA or occupancy.

  - Allocated project parking = Total site parking × (Project GIA ÷ Total GIA), OR
  - Allocated project parking = Total site parking × (Project occupancy ÷ Total occupancy)
- Apply this proportion to the total parking provision (new and existing) to determine the number of spaces associated with the extension.
- Use this number of spaces to determine the EV infrastructure requirements based on the relevant criteria.

M2: Cycle storage spaces and cyclists' facilities

Option 7 (1 point) and Option 8 (1 point) from Table 64 on page 256

Table 69 sets out the **minimum number of cycle storage spaces** required for each type of building. See compliant cycle storage in Definitions. The principle is that staff cycle storage determines the need for facilities, while visitor storage is provided separately but does not generate additional facility requirements.

1. The number of **cyclist facilities** is determined only by the number of **staff** cycle storage spaces. Storage provided for visitors, clients or patients does not affect this calculation (e.g. visitors arriving by bicycle are not expected to require showers or changing facilities).
2. All calculations must be **rounded up** to the nearest whole number. For example, a calculated requirement of 5.3 cycle spaces means that 6 spaces must be provided.
3. Once the calculation (including rounding) has been completed, the following **absolute minimum provision** must still be met:
   a. At least **4 cycle spaces** for all building types.
   b. At least **10 cycle spaces** for large retail assets.
4. These minimums apply **regardless of any reductions** permitted under M2.3 (high PTAI), M2.4 (rural location), or M2.5 (sliding scale).

Table 69: Cycle storage spaces required for each type of building (Option 7)

Building type	Number of spaces	Unit of measure	Notes
Type A	1 per	10 staff	A building predominantly occupied by staff or employees with occasional business-related visitors, e.g. office, industrial, fire station, police station. This includes hospitality, where visitors typically stay for less than one month.
Type B	1 per	10 building users (staff **and** visitors)	A building occupied by core staff or employees with consistently frequent visitors or users (either residents or non-residents). This includes cafés, restaurants, culture and entertainment, sports and leisure and

Building type	Number of spaces	Unit of measure	Notes
			secure accommodations. Compliant cyclists' facilities are required for staff only.
Specific building types			
Retail			
Large retail	1 per	10 staff **and**	For staff calculation, use the maximum number of staff at any one time or shift. Provide a minimum 10 cycle spaces for building users.
	1 per	20 public car parking spaces	
Small retail	4	In total	Spaces are publicly accessible within proximity of a main building entrance. Compliant cyclists' facilities are required for staff only.
Education			
When an educational facility consists of buildings in more than one category (e.g. nursery and primary school), select the dominant building type in the BREEAM Platform. Calculate the requirement separately for each user group and combine the results. For instance, a combined preschool and primary school will need to meet both 1 space per 10 staff and 5 spaces per class in year group requirements.			
Preschool	1 per	10 staff	-
Primary school	5 per	Class in the largest year group	Where the number of classes varies across year groups. For example, a primary school with five classes in its biggest year group would provide 25 cycle storage spaces for the whole school.
Secondary school or higher education	1 per	10 staff **and**	Secondary school covers education from ages 11–18. Higher education: all students accounted for: — Undergraduates — Post-graduates — PhD students — Post-doctorates
	1 per	10 students	
Healthcare			
All healthcare building types	1 per	10 staff **and**	For staff, use the maximum number at any time or shift.
	1 per	2 consulting rooms **or** 10 beds	Use the largest unit of measure for the building type. For example: — Use beds for a hospital. — Use consulting rooms for a doctor's surgery. For special healthcare buildings (e.g. chemotherapy centres, maternity wards), cycle spaces for patients/visitors may be excluded.
Residential institution			
Student accommodation (Halls of residence), key worker accommodation, military barracks, local authority secure residential accommodation	1 per	10 staff **and**	-
	1 per	2 residents	
Residential care home, sheltered housing	1 per	10 staff **and**	-
	1 per	10 visitors or beds	
Sliding scale of compliance Where the number of building users (based upon the unit of measure) exceeds 200, the sliding scale of compliance can be used to identify the appropriate number of cycle spaces required (see M2.5).			

M2.1: Estimating provision – Unknown building occupancy

If building occupancy is unknown, estimates must be based on either:

- Default occupancy rates (see Table 72 on page 270), or
- Rates from a comparable building type and size

Justifications must be included in the assessor's report.

M2.2: Cyclists' facilities requirements

Cyclists' facilities (e.g., showers, lockers, drying spaces, changing rooms) must be provided based on the number of staff cycle storage spaces. Visitors, clients, and patients are excluded from this calculation.

Facilities must meet the specifications outlined in the Definitions section for compliant facilities.

M2.3: Adjustment for high Public Transport Accessibility Index (PTAI)

Where the site achieves a high PTAI score (i.e. meets the threshold set in Option 1, Table 64 on page 256), the number of required cycle storage spaces and associated cyclist facilities may be reduced by 50%.

Note: This reduction cannot be combined with those in M2.4 (rural location) or M2.6 (public bicycle sharing systems).

M2.4: Adjustment for Rural locations

Cycle storage and associated facility requirements are reduced for rural sites, based on their distance from the nearest urban centre. The applicable reductions are shown in Table 70 below.

Table 70: Rural location distance to reduce the number of cycle storage spaces and cyclists' facilities

Distance to nearest urban location	Cycle storage and cyclist facility requirement adjustment
> 15 km	Reduced by 50%
> 30 km	Reduced by 70%
> 50 km	Reduced by 90%

M2.5: Adjustment for large user assets – Sliding scale

Option 7 from Table 64 on page 256

Where the number of building users exceeds 200, a sliding scale can be used to reduce the required number of cycle storage spaces, as set out in Table 71 below.

This scale applies up to 5,000 users. Beyond 5,000 users, no further cycle storage is required.

The sliding scale of compliance **does not** apply to the following building types:

- Large retail
- Primary schools
- Residential institutions and military residential buildings

Table 71: Sliding scale of compliance – multiplier based on number of users

Number of users	Multiplier for standard unit of measure
1–200 users	× 1.0
201–300 users	× 1.5
301–400 user	× 2.0
401+ users	× 2.5

Example calculation

For example, an office building with 800 users:

- *1–200 users @ 1 space per 10 users = 20 spaces*
- *201–300 users @ 1 space per 15 users (unit of measure × 1.5) = 6.7, rounded up to 7 spaces*

— *301–400 users @ 1 space per 20 users (unit of measure × 2) = 5 spaces*
— *401+ users @ 1 space per 25 users (unit of measure × 2.5) = 16 spaces*

Total compliant cycle storage spaces required = 48 spaces.

M2.6: Public bicycle sharing systems – Partial compliance option

Public bicycle sharing systems and cycle storage

Up to 50% of the required cycle spaces may be provided by a public bicycle-sharing system if the system is:

1. Implemented by the local government through a public-private partnership.
2. Open to casual users who wish to use it for one-way rides.
3. Available at unattended urban locations throughout the city.
4. Supplied with service terminals at maximum 500 m (on average) distance from each other in inner city areas.
5. Available within 500 m of the main building entrance.

Unlike all other cycle storage spaces referred to in this issue, the bicycle terminals of a public cycle sharing system do not need to be compliant as described in the Definitions.

Cyclists' facilities and public bicycle-sharing systems

Using public bicycle-sharing systems to supply cycle spaces does not reduce the requirement for cyclists' facilities. This is still based on the total number of spaces, including public cycle spaces.

M3: Cycle storage spaces and cyclists' facilities on sites with multiple buildings

Option 7 (1 point) and Option 8 (1 point) from Table 64 on page 256

Where:

— A new or infill building is constructed on an existing site. OR
— Multiple new buildings are to be constructed on the same site.

Compliance can be assessed either for one building or for the whole site, depending on the configuration and location of the proposed cycle storage and associated facilities. Whichever approach is chosen, the assessor must justify this choice in their report.

M3.1: Standalone approach

The guidance for calculating the cycle storage requirement and associated facilities for a building on a multi-building site is the same as for any single building.

In this case, the location, signage and access must make clear that the cycle spaces assigned to users of the assessed building are for their specific use.

M3.2: Site-wide approach

Where a group of buildings are on a site sharing cycle storage spaces and/ or facilities, the requirement can be calculated based on all site users.

Cyclists' facilities may be located in designated areas to ensure easy access and usability, and existing compliant facilities can be included in the calculation. However, the route to the cycle storage and facilities must be within 500 metres of the main entrance of the assessed buildings, measured along a safe and convenient path.

For sites with strict security protocols, where all staff are required to pass through a centralized facility (e.g., staff room or security checkpoint) before proceeding to their work areas, it is acceptable to calculate the distance only between the cycle storage and the centralized cyclist facilities. Evidence should include a site plan and confirmation of staff movement through the centralized location.

M3.3: Combination of the two approaches

Where appropriate, cycle storage can be provided based on a site-wide assessment, with facilities provided on a building-by-building basis.

In the opposite instance, where cycle storage spaces are provided for a single building, but associated facilities are shared by buildings across the site, the number of facilities must be based on the number of site users rather than on cycle spaces for the single building. Such facilities must be close to cycle storage for all users.

M3.4: Provision for extensions

When assessing an extension to a building, partial refurbishment, or a stand-alone building that extends an existing facility for the same building users, the site-wide approach can be used to determine the number of cycle spaces required.

M3.5: Phasing or pending demolition works

Where cycle storage cannot be installed at the construction stage due to phasing or pending demolition works, compliance can still be shown, provided that:

- Context and justification are given for why the storage is unavailable.
- A written contractual agreement is in place to provide BREEAM-compliant storage within a clear and justifiable time scale, accounting for related works that could reasonably delay the final installation of facilities related to the development.
- In the meantime, alternative storage is provided that allows bikes to be easily stored, removed and locked securely against a fixed structure.

These temporary measures apply to cycle storage spaces only. Provision of cyclists' facilities must be assessed in the usual way.

M4: Existing and new amenities

Option 9 (1 point) and Option 10 (2 or 3 points) from Table 64 on page 256

To achieve points under Option 9 or Option 10, the building must have access to relevant accessible amenities. All amenities, whether new or existing, must be within 500 m of the assessed building's main entrance via a safe pedestrian route. The relevant types of amenities are listed below and apply to all building types:

1. Appropriate food outlet
2. Access to an ATM (cash machine)
3. Access to an outdoor open space (public or private, provided suitably sized and accessible to building users)
4. Access to a recreation or leisure facility for fitness or sports
5. Publicly available postal facility
6. Community facility
7. Dispensing pharmacy
8. Public sector doctor's surgery or general medical centre
9. Childcare facility or school

Notes:

1. An amenity can be provided by the assessed building itself if that is its function, for example, it is a food shop or a pharmacy.
2. Amenities may be inside an assessed building or on-site, for example as part of a campus, retail or business park or centre.
3. Amenities may be part of a masterplan where this has been produced by a single developer, and such amenities may be assessed as new, rather than existing for building-level assessments on the site.
4. More than one amenity may be provided at a single location, for example, an ATM and a pharmacy within a supermarket development could be considered as three amenities.

M4.1: Existing amenities

Option 9 (1 point) from Table 64 on page 256

One point can be awarded for providing at least three accessible types of amenities ≤ 500 m via a safe pedestrian route.

M4.2: New additional amenities

Option 10 (2 or 3 points) from Table 64 on page 256

Two or three points can be awarded for providing new additional amenities ≤ 500 m via a safe pedestrian route.

If new additional amenities duplicate the services provided by existing amenities, this is still recognised. This is because these duplicate amenities still offer additional choices to users in terms of services and location.

If a development provides an amenity to replace an existing amenity, regardless of whether there is a qualitative enhancement or change of amenity type, this must be considered as an existing amenity.

A new amenity provided by the development may only be considered as 'additional' where there is a net increase in the number of compliant amenities resulting from the development.

- **2 points:** at least one new additional amenity type.
- **3 points:** two or more new additional amenity types.

Compliance notes

Ref	Terms	Description
CN1	Existing sustainable transport measures	Existing sustainable transport measures may be considered where they are BREEAM-compliant, appropriately located, and available to all relevant users of the refurbishment project.
CN2	PTAI calculation – Changes to public transport services during the assessment	The PTAI is calculated as part of the design stage transport analysis described in Tra 01. It serves as a benchmark from that time and should not be updated at the post-construction certification stage.
CN3	More onerous requirements	Where the local authority's requirements are more onerous than BREEAM (e.g., number of electric charging points or cycle storage spaces), these must be met for credits to be awarded.
CN4	Cycle spaces – Public realm provision	Where it is not possible to locate short-term visitor or customer cycle storage spaces within the assessment boundary, these may be provided in a suitable and convenient location within the public realm. The assessor must be satisfied that there is a legal agreement and a long-term commitment to maintain these spaces. Overhead covering may be waived if justified. Existing public spaces do not count toward compliance.
CN5	Cycle spaces – Specialist education assessments	For specialist educational institutions (for example, non-acute SEN facilities) assessors should use their judgment on how to base their cycle storage calculations. Supporting evidence needs to be provided, along with the assessor's comments or notes, to clarify the calculations used to demonstrate compliance.
CN6	Cyclists' facilities – Education: Primary schools	Additional facilities for pupils can include adequate cloakroom space for storing outdoor clothing and cycle helmets. For staff, facilities should include 1 locker per 10 staff members and 1 shower per 10 lockers, with at least one shower provided. Primary school pupils are not expected to have private showers or cycling facilities.
CN7	Cyclists' facilities – Education: Secondary schools	In secondary schools with sports facilities, compliance is met for **students** by providing lockers, as showers and changing spaces are assumed to be included with the sports facilities and do not need separate assessments. For **staff**, separate showers and changing facilities must be provided. While locker facilities can be shared with students if appropriately located, staff lockers should be conveniently situated near other staff facilities. The number of showers for staff should be based on the total number of staff, with a minimum of one shower for every 100 staff members.
CN8	Cyclists' facilities – Residential institution	Where there is a BREEAM requirement for residents, compliant facilities within their accommodation can be considered as cyclists' facilities. Separate facilities for staff

Ref	Terms	Description
	(long term stay)	must be provided as required to achieve compliance.
CN9	Cycle facilities – Part 1 and Part 2 assessments	Developers must provide all aspects of additional cyclists' facilities within their scope of work and enable future completion of any remaining aspects. For example: if core areas lack facilities such as showers, drying space, or internal walls to tenanted areas, these must be noted on design drawings, with necessary services provided for future installation by tenants. Developers must show that they are enabling future installation of BREEAM compliant facilities within their scope of work. Where internal walls are within scope, a compliant changing area must be provided, however for lockers, compliance can be achieved by providing a design drawing showing that there is an adequately sized and suitably located space for the required number of compliant lockers.
CN10	Limiting or restricting car parking capacity	Compliance typically relies on external requirements such as site constraints, planning restrictions, or nearby public parking, which are not active efforts to reduce private car reliance. Restricting parking is not generally an alternative sustainable transport measure, except when meeting specific criteria: — The travel plan recommends the absence of standard parking. — The development has an Public Transport Accessibility Index ≥ 25. — There is adequate site access, but parking has been deliberately omitted to promote alternative transport. Please submit this as assessment Option 11 for BRE to review.
CN11	Phased developments	Where new sustainable transport measures will be provided but at a later stage than the completion of the assessed building, they can still count toward BREEAM compliance provided there is a formal commitment (e.g. within the General Contract Specification) to deliver them within the shorter of: — When 25% of all phases are complete and occupied. OR — Within 25% of the total build time for the phase of the assessed building (measured from that phase's completion). Importantly, if these transport measures will not be available within five years of the building's occupation, they cannot be considered for compliance.
CN12	Accessible amenities and PTAI – Main building entrance to consider for sites with multiple buildings	For assessments on sites with multiple buildings (e.g. education campus, business or industrial parks): — Distances to amenities and public transport nodes can be measured from the site's main entrance if ≥80% of buildings are within 1000 m. Otherwise, use the assessed building's main entrance, and in such cases, where multiple buildings are included, calculations must always be based on the worst-case scenario (the entrance furthest from the node or amenity). — Where the site has more than one main entrance, either entrance may be used for the calculation.

Evidence

Criteria	Interim design stage	Final post-construction stage
1	A copy of the transport assessment or statement. A copy of the travel plan.	No further actions required post-construction; no additional evidence is required other than that listed for the design stage.
2	Documentary supporting evidence to verify how the assessment options have been or will be achieved. Evidence may include: — Design drawings — Clauses of building specifications	Robust post-construction evidence to verify measures have been implemented. See individual options for more details.

Criteria	Interim design stage	Final post-construction stage
	— Contracts — Commitment letters See individual options for more details.	
Sustainable transport options		
Option 1	— Submit the PTAI calculation inputs to the BREEAM Platform. — Scale map highlighting the location of the building and all public transport nodes in the proximity of the building. — Timetables for each service at each public transport. — Calculations to show average services per hour for each node. — Where applicable, information about on-demand bus services.	No further actions required post-construction; no additional evidence is required other than that listed for the design stage.
Option 2	— Documentary supporting evidence showing how the PTAI improvement will be achieved i.e. meeting minutes, correspondence with local public transport companies or contractual agreements. — PTAI calculations demonstrating the improvement over the existing PTAI.	— Final PTAI calculations confirming improvement. — Updated evidence, including public transport services, timetables, and maps, submitted for final assessment.
Option 3	— Specifications for the public transport information system (e.g., digital displays or online tools). — Proposed location and accessibility plan for the information system.	— Assessor's site inspection report and photographic evidence of the installed public transport information system. — Documentation showing the system is fully operational and provides real-time updates.
Option 4	— Design drawings showing the planned EV charging parking spaces (passive and active) and total number of parking spaces provided. — Specifications for the EV charging points (e.g., ≥ 7 kW). — Submit the calculation inputs to the BREEAM Platform. — Contractual agreements or purchase orders for EV charging infrastructure.	— Assessor's site inspection report and photographic evidence of the EV charging infrastructure. — Final construction drawings or equivalent showing the location of EV charging parking spaces (passive and active) and total number of parking spaces provided. — Confirmation of installation of EV charging points (minimum 7 kW) such as manufacturer's data sheets and electrical capacity verification.
Option 5	— Car sharing group or policy evidence (e.g., documentation, meeting minutes). — Marketing or communication materials. — Marked-up site plan showing priority spaces for car sharers and total number of parking spaces provided.	— Final policy confirmation, including final car sharing scheme. — Assessor's site inspection report and photographic evidence showing car share spaces in place. — Final construction drawings or equivalent showing the priority spaces for car sharers and total number of parking spaces provided.
Option 6	Correspondence, meeting minutes, or contractual agreements showing consultation with the local authority on cycling and pedestrian routes.	Assessor's site inspection report and photographic evidence confirming the implementation of agreed cycle or pedestrian route improvements.

Criteria	Interim design stage	Final post-construction stage
		Final construction drawings or equivalent where required.
Option 7, Option 8	— Assumptions and calculations used to determine the number of building users for cycle storage and facilities required. — Design drawings, relevant sections of the building specifications or contract clauses to confirm compliant cycle storage and facilities will be provided.	Assessor's inspection and photographic evidence confirming the installation of compliant cycle storage and associated cyclist facilities (e.g., showers, changing facilities, lockers). Final construction drawings or equivalent showing the installed cycle storage and facilities.
Option 9, Option 10	Marked-up site plan or web-based map viewer highlighting: — Building location — Location and type of amenities — Route to amenities — Plan/map scale. For amenities under development, a letter from the client or developer confirming: — Location and type of amenities — Timescale for development	Assessor's site inspection and photographic evidence confirming: — The existence of local amenities. — Route and distance to amenities. OR Updated and dated marked-up site plan or a web-based navigation map viewer highlighting: — Current location and type of local amenities. — Current route and distance from the building via a safe pedestrian route. — Plan or map scale. OR Where amenities are under development, evidence such as the developer's letter outlining progress and timescale for amenities being available.
Option 11	Submitted proposal and confirmation from BRE.	Will be dependent on the proposed improvement measures. General requirements might include: — Assessor's site inspection and photographic evidence. — Final construction drawings or equivalent.

Definitions

Accessible amenities

Amenities are deemed as accessible if they can be reached via **safe pedestrian routes** during typical working hours for the type of building. Amenities that are unavailable when appreciable numbers of site users would like to use them are not considered accessible.

— **Appropriate food outlet:** a fixed asset that caters to the day-to-day needs of most building users — for example, a café, take-away, restaurant or food shop. A vending machine can qualify as a food outlet if it consistently offers a variety of items that reasonably meet the needs of building users and is confirmed to be a permanent fixture. A food truck or mobile catering service would not be sufficient to meet the criteria for this issue.

— **Access to an ATM (cash machine):** refers to the availability and convenience of reaching an Automated Teller Machine (ATM) to access cash. The building users should have access to cash at all relevant times of the day. An ATM inside a building is acceptable as long as its operating hours are convenient for building users.

— **Suitable outdoor open space:** a space that allows building users to sit outside and take a break. For example, an open-air courtyard or external space within the site, a pedestrianised public piazza or a local park. The space must be

suitably sized for the number of people likely to use it and must not form part of the public highway.

- **Recreation or leisure facility:** a building that allows building users to exercise and maintain a healthy lifestyle. Examples include a local leisure centre, tennis courts, or a gym.
- **Publicly available postal facility:** a publicly accessible facility that enables the general public to send postal items. This includes staffed facilities offering postal services, traditional post boxes, and multicarrier smart lockers that support outbound services for multiple independent operators. Single-carrier lockers or collection-only points are excluded.
- **Community facility:** a space that facilitates community activities for the assessed building's users. For example, a community centre or hall, collaborative work areas, recreational zones, shared gardens, or allotments. Note that the suitability depends on the building's purpose and the needs of its occupants.
- **Dispensing pharmacy:** an accessible pharmacy that provides prescribed medicines for building users. If services are confirmed, an internal pharmacy within a hospital or an on-site controlled medical dispensary may be acceptable.
- **Public sector doctor's surgery or general medical centre:** a healthcare facility or general medical centre providing general practitioner services and basic medical care to the community.
- **Childcare facility or school:** a dedicated facility or institution that provides child support for potential building users, such as nurseries or schools.

Building user

Building users are those who will utilize the cycle storage and facilities. Depending on the type of building being assessed, this includes specific groups based on the building's function, such as office staff, commercial staff and visitors, or school staff and students.

Car sharing group

Car sharing refers to a coordinated initiative established, promoted and overseen by asset management to assist building users in sharing private car journeys to and from work. The primary goal is to reduce overall reliance on individual cars for commuting; they differ from vehicle rental or loan schemes. Car sharing must be accessible to all building users who regularly commute by private car. The designated spaces for car sharing must be distinct from customer or visitor areas in the development.

Compliant cycle storage spaces

Cycle storage must be secure, protected, conveniently located, safe to use and sufficiently spacious to manoeuvre. The cycle storage spaces must meet the following criteria:

1. Cycle storage spaces must provide with the means to secure one or more cycles with fixings that allow both the wheel and frame to be locked securely. Cycle spaces must be set in or fixed to a permanent structure (building or hardstanding) and covered overhead. Alternatively, they may be located in a locked structure fixed to, or part of, a permanent structure with appropriate surveillance.
2. The distance between each cycle rack, and between cycle racks and other obstructions such as walls, must allow cyclists to access storage easily.
3. Cycle storage spaces must be in a prominent location that is easily seen, either from an occupied building or from the main access to a building. Where cycle storage spaces are within the building, prominent signage should indicate their location to building users.
4. The cycle storage spaces must have adequate lighting, demonstrated by meeting the lighting criteria in Hea 02 Electric light. Shell only to demonstrate evidence of future provision.
5. Lighting must be controlled to avoid out-of-hours use and operation during daylight hours when natural light suffices.
6. Cycle storage that is only suitable for folding bicycles or scooters is not compliant.

> BREEAM is not prescriptive about the cycle storage dimensions and type required to demonstrate compliance. The assessor is expected to exercise their professional judgement to determine whether the cycle parking spaces meet the aims of Tra 02 and the requirements listed.

BREEAM is used to certify buildings, not products. Therefore, cycle parking systems are not inherently 'BREEAM compliant'. These must be assessed in the context of their location and intended user profile.

Compliant changing facilities

Compliant changing facilities are defined as those that meet the following:

1. Changing areas must be appropriately sized for the likely or required number of users. The assessor should judge whether the changing area is sufficient based on the number of showers or number of cycle storage spaces provided.
2. Private spaces (not toilets or showers – see 4 below) must be provided for cyclists of any gender to change.
3. Changing areas must include adequate space and facilities to hang or store clothing and equipment while changing or showering, e.g. bench seat or hooks.
4. Toilet or shower cubicles cannot be counted as changing facilities

Compliant drying spaces

A compliant drying space is defined as one that is specifically designed and designated for this purpose. It should have suitable finishes, adequate heating and ventilation, and the facility to hang wet clothes with sufficient air movement around them to dry effectively.

Examples of non-compliant spaces include:

— Plant rooms: their use as a drying space may create a health and safety hazard.

— Coat hooks in cloakrooms or staff changing areas are unlikely to provide adequate ventilation to dry clothing effectively.

Compliant lockers

Compliant lockers are defined as:

1. Sized appropriately for the storage of cyclists' equipment.
2. Adjacent to compliant changing rooms, where provided.
3. The number of lockers is at least equal to the number of cycle spaces required.

Compliant showers

Compliant showers are defined as follows:

1. One shower is provided for every 10 cycle storage spaces, subject to a minimum of one. Any building with eight or more showers complies regardless of the number of cycle storage spaces provided.
2. Showers must cater for both male and female users. Either separate showers within gender-specific facilities (required split 50:50) or single shower cubicles and mixed-use changing spaces. The assessor can consider a deviation from the 50:50 split guidance if justified by occupancy data, or if design teams want a flexible shower arrangement for all users.
3. The showers do not need to be dedicated to cyclists and can be shared with other users or uses.

Dedicated transport service

A dedicated transport service, such as a dedicated bus, coach, or minibus, provided or managed by the building owner or management, can be considered for any building type with a fixed usage pattern. The dedicated transport must provide a transfer to the local population centre or public transport interchange, or it may be a door-to-door service.

Generally, a dedicated service must be available to all regular building users. However, for primary and secondary schools, a dedicated service available to students only can be considered compliant.

Electric vehicle charging infrastructure (EV charging infrastructure)

EV charging infrastructure refers to the network of facilities and equipment designed for charging EVs. This includes:

1. **Active EV charging infrastructure:** specifically designated locations within a parking space with fully installed and functional EV charging points.
2. **Passive EV charging infrastructure:** parking spaces that have the necessary groundwork in place, including cable routes, electrical conduits, and electrical supply capacity in the distribution system to accommodate the future installation of cables and EV charging points.

Large retail

This refers to large retail developments, such as shopping centres, retail parks and supermarkets, which typically will have covered or uncovered parking, or external areas, and therefore scope to provide their own dedicated cyclists' storage.

Safe pedestrian route

Safe pedestrian routes include pavements, paths, and safe crossing points. The distance must not be measured in a straight line but along an actual walking route.

Priority spaces

Priority spaces are parking spaces designated for users with specific needs, such as people with disabilities, parents with young children, or others who require enhanced accessibility and convenience.

Rural location

This includes any building type for which a rural population has a demonstrable social or economic local need. A rural location is defined as an area outside an urban cluster. Sparse settlements and low population density commonly characterise these areas. Rural locations may face challenges due to limited infrastructure and transportation options. People living in rural areas may be content with longer travel distances and limited access to services and amenities, necessitating greater distances for essential needs.

You may refer to the local government's guidance on classifying rural locations.

Small retail

Smaller retail units or shops that may form part of a wider retail or business district, city or town centre, or mixed-use sites, and typically do not have the scope to provide their own dedicated cyclists' storage.

Additional information

Default occupancy rates by building type

Table 72 below provides default occupancy rates for various building types if the number of building occupants commuting to the development cannot be confirmed (see M2.1). Select the most appropriate.

Table 72: Default occupancy rates by building type

Building type and function area	Occupant density
Business	
Office area (including reception areas)	0.111
Food preparation area (staffed)	0.108
Small workshop or category lab space	0.050
Industrial	
Food preparation area	0.213
Industrial process area	0.050
Laboratory	0.050
Reception	0.110
Warehouse storage	0.050
Generic office area	0.108
Hospitals, care homes	
Reception	0.152
Post-mortem facility	0.050

Building type and function area	Occupant density
Food preparation area	0.161
Physiotherapy studio	0.200
Bedroom unit	0.105
Laundry	0.117
24-hours consulting or treatment areas	0.07
Assembly areas or halls	1.000
Hydrotherapy pool hall	0.100
Industrial process area	0.124
Laboratory	0.080
Operating theatre	0.125
Classroom	1.000
Diagnostic imaging	0.100
Generic ward	0.175
Office and consulting area	0.195
Primary healthcare	
Reception	0.110
Office and consulting areas	0.082
Further and higher education	
Residents bedroom	0.120
Classroom	0.203
Food preparation area	0.096
Hall, lecture theatre or assembly area	0.202
Computer laboratory	0.231
Laboratory	0.106
Laundry	0.105
Reception	0.112
Workshop – small scale	0.068
Office and consulting areas	0.103
Hotels	
Bedroom	0.050
Food preparation area	0.108
Reception	0.105
Generic office area	0.106
Secure residential institution	
Cell	0.190
Reception	0.121
Hall, lecture theatre or assembly area	0.183
Eating and drinking area	0.141
Workshop – small-scale	0.048
Laundry	0.086
Classroom	0.183
Office and consulting areas	0.093
Food preparation area	0.111
Libraries, museums, galleries	
Reception	0.095
Food preparation area	0.176
Hall, lecture theatre or assembly area	0.150
Laboratory	0.098
Workshop – small-scale	0.062
Display and public areas	0.150

Building type and function area	Occupant density
Generic office area	0.099
General assembly and leisure, clubs, theatres	
Dry sports hall	0.047
Fitness studio	0.132
Fitness suite or gym	0.170
Food preparation area	0.131
Hall, lecture theatre or assembly area	0.175
Auditorium	0.341
Ice rink	0.225
Performance area (stage)	0.049
Public circulation areas	0.241
Reception	0.126
Sales area – general	0.102
Swimming pool	0.163
Workshop – small-scale	0.067
Generic office area	0.116
Community or day centres	
Reception	0.108
Dry sports hall	0.047
Food preparation area	0.143
Workshop – small scale	0.064
Hall, lecture theatre or assembly area	0.169
Office and consulting areas	0.106
Other	
Data centre	0.096
Server room	0.096
Heavy plant room	0.096

Notes

1. The net floor area for each function must be multiplied by the equivalent occupant density to determine an overall occupancy for the function area.
2. Not all potential building areas are listed, only those required to reflect estimated building occupancy for the building type. For example, an office building may have a canteen but it will be the staff that predominantly use the canteen. The office staff numbers will be estimated using the default occupancy rate for the office area; therefore to include the canteen would result in double counting of occupancy.
3. If a building type is not listed, occupancy rates for a similar building type or function area may be used.
4. The above occupancy rates have been sourced from the activity database of the Simplified Building Energy Model (SBEM), v.5.4a.
5. If the occupancy rates produced are unrealistic, please refer to the alternative option to provide the number of occupants (see M2.1).

Water



Summary

This category encourages sustainable water use in the operation of the building and its site. Issues in this section focus on identifying means of reducing potable water consumption (internal and external) over the lifetime of the building and minimising losses through leakage.

Assessment issues

Wat 01 Water consumption	5 credits + 1 exemplary
Wat 02 Water monitoring	1 credit
Wat 03 Water leak detection and prevention	up to 2 credits
Wat 04 Water efficient equipment and systems	up to 3 credits
Wat 05 Prediction of operational water consumption	1 credit + 1 exemplary

Wat 01 Water consumption

(all buildings)

Aim

To reduce the operational water consumption for sanitary uses in buildings by installing water efficient components and rainwater collection and water recycling systems.

Overview

Assessment type	Credits available	Minimum standards	Applicable assessment criteria
Part 1: Fabric and structure	0	None	Not applicable
Part 2: Core services	5 + 1 exemplary	Good, Outstanding	All (see ref 1.0 and 1.1)
Part 3: Local services	5 + 1 exemplary	Good, Outstanding	All (see ref 1.0 and 1.2)
Part 4: Interior design	5 + 1 exemplary	Good, Outstanding	All (see ref 1.0 and 1.3)
EU Taxonomy	-	-	1

Assessment type specific notes

Ref	Assessment type specific note
1.0	This issue is filtered out where there are no water-using components included in the scope of the assessment that will be present in the building when it is operational.
1.1	**Part 2 only assessment** All water using components located within common areas must be assessed.
1.2	**Part 3 or Part 3 and 4 assessments** Water using components located within separate functional areas and within separately tenanted areas must be assessed.
1.3	**Part 4 only assessment** Any water consuming components included within the scope of the assessment should be assessed.

Building type specific notes

Ref	Building type specific note
2.0	**Healthcare buildings** Water-using components in clinical areas do not need to be assessed. Components in non-clinical areas may also be excluded where they are not appropriate for the needs of patients or may adversely affect the incidence and propagation of infections, where justified by an appropriate health professional. Where all water fittings are excluded from assessment the minimum standard is not applicable.

Assessment criteria

Up to five credits (plus one exemplary credit) – Water consumption

1 Determine the water efficiency of all in-scope water-consuming components.

2 Determine the amount of recycled water expected from approved blackwater, greywater, and rainwater systems.

3 The number of credits awarded is determined by the percentage improvement in water consumption in litres per person per day for the actual building compared to that of a baseline building are shown in Table 73 on the next page.

Table 73: Water consumption credits

Percentage improvement over baseline	Number of credits
≥ 15%	1
≥ 30%	2
≥ 45%	3
≥ 60%	4
≥ 75%	5
≥ 85%	5 + 1 exemplary

Methodology

M1: In-scope water-consuming components

Identify which of the following sanitary water-consuming components are present in the building post-refurbishment:

- WCs/toilets
- Urinals
- Taps/faucets (on wash-hand basins, kitchen sinks and waste disposal units)
- Showers
- Baths
- Dishwashers (domestic and commercial-sized)
- Washing machines (domestic and commercial sized)

For each of the above water fittings that are present pre refurbishment, determining which of the following they will be post refurbishment according to their scope

- Added
- Replaced
- Upgraded
- Kept in situ

Information on the types of water-using components present in the building, and the number of each type of water-using component should be entered into the BREEAM Platform. For components that are replaced or upgraded in the project specification, the water efficiency of each component type should be entered. Where fittings are kept in situ, the water efficiency is not known, the baseline water efficiencies will be assumed.

M1.2: Out of scope water-consuming components

Where one or more of the following conditions apply to any water-consuming component, they may be excluded from the scope of this Issue:

1. They are used for a process related function, scrub-up taps, cleaners' sinks etc.
2. They are specialist water components, e.g. specialist assisted baths.
3. They are used in religious practices, e.g, low level ablution taps.

M2: Data requirements

M2.1: Data requirements for water-consuming components

The data required for each type of water-consuming component is shown in Table 74 below.

Table 74: Data requirements for each type of water-consuming component

Water-consuming component	Data requirements
WCs/toilet	Full flush and, where applicable, reduced flush volume in litres per use
Urinal	Flush volume in litres/bowl/hour
Washbasin taps/faucet	Maximum flow rate in litres per minute, including any reduction achieved with integrated flow restrictors [note 1]
Shower	Maximum flow rate in litres per minute, including any reduction achieved with

Water-consuming component	Data requirements
	integrated flow restrictors
Kitchen tap	Maximum flow rate in litres per minute, including any reduction achieved with integrated flow restrictors
Bath	Capacity to overflow in litres [note 2]
Dishwasher – domestic sized	litres/cycle
Dishwasher – commercial sized	litres/rack
Washing machine – domestic sized	litres/use (based on a typical wash cycle)
Washing machine – commercial sized	litres/kg
Waste disposal unit	Flow rate in litres per minute

Notes

1. The flow rate of a tap or shower will vary depending on the water pressure:
   - For high pressure supply systems, test measurements should be undertaken at 3 ± 0.2 bar (0.3 ± 0.02 MPa).
   - For low pressure supply systems, test measurements should be undertaken at 0.1 ± 0.02 bar (0.01 ± 0.002 MPa).

2. The calculation of water consumption for baths assumes 40% of the capacity to the overflow. This is to reflect that:
   - Users tend not to fill the bath to overflow.
   - The displacement effect the user has on the actual volume of water required for a bath.

M2.2: Calculating flow rates for different water consuming components

M2.2.1: Calculating flow rates for push and automatic shut-off taps

The water consumption of push and automatic shut-off taps using the following steps:

1. Calculate the water consumption per person per use. If a tap runs for less than 20 seconds per activation, assume it will be activated twice per person for the timed duration.

   For example, for a tap with a flow rate of 9 litres/min and a 15 second usage duration, the water consumed per person would be: 9 × (15/60) × 2 = 4.5 litres/min.

   If a tap runs for 20 seconds or more per activation, assume one activation per person for the timed duration.

   For example, for a tap with a flow rate of 9 litres/min and a 20 second usage duration, the water consumed per person would be: 9 × (20/60) × 1 = 3 litres/min.

2. Multiply the water consumption figure per person by 1.5 and enter this figure into the calculator tool.

   Multiplying by 1.5 adjusts the consumption figure to compensate for the typical non-timed tap use of 40 seconds that has already been taken into account in the tool. Taking the first example above, 4.5 litres/min multiplied by 1.5 gives 6.75 litres/min. When this is used in the tool as the flow rate specification, the consumption is 4.57 litres/person/day which more closely reflects the true level of water consumption for the push tap.

M2.2.2: Flow rate for a mixture of taps

Where there is a mixture of taps used, whichever is the higher of the 'average flow rate' or the 'proportionate flow rate' should be used within the BREEAM Platform.

M2.2.3: Flow rate for a shower with multiple heads

To calculate the water use of a shower with more than one shower head, one of the following should be done:

- If all of the shower heads can be turned on at once, the flow rates should be added up.
- If the shower heads can only be used one at a time, the highest flow rate should be used.

M2.2.4: Calculation of litres/bowl/hour for urinals

A flushing frequency of two flushes per hour is used in the BREEAM Platform and should be applied when calculating the volume of water dispensed by urinals and compared against the water efficient consumption levels by component type for the Wat 01 issue. This method should be applied to calculate litres/bowl/hour.

For example, a 13.5 litre cistern feeding 3 bowls which is flushed 2 times per hour:

(13.5 litres / 3 bowls) × 2 times an hour = 9 litres/bowl/hour

M2.2.5: Calculating flow rates for showers and taps where use is physically time-limited

Where a timer is used to physically limit the use of showers or taps within a set period of time, this can be used as the basis for calculating a reduced flow rate.

For example, where use is limited to 2 minutes, 4 times per hour, for a shower or tap with a flow rate of 8 litres per minute, the flow rate can be calculated as follows:

8 litres/min × 8 min/hour = 64 litres/hour = 1.07 litres/min

M2.3: Data requirements for blackwater, greywater, and rainwater systems

Where blackwater, greywater, and rainwater systems are installed the following information must be entered into the BREEAM Platform:

For blackwater and greywater systems:
The percentage volume of wastewater collected (and reused) from the following where relevant: wash-hand basins, showers, kitchen sinks, dishwashers, baths, washing machines and sources of wastewater from non-domestic components.

For rainwater systems:
Either

- Horizontal projection of the collection area (m²)
- Surface yield co-efficient (%)
- Hydraulic treatment efficiency co-efficient (%)
- Annual local rainfall (mm/year)

OR

- Daily rainfall collection (litres)

Daily rainfall collection (litres) must be calculated in accordance with credible and verifiable national or local data, e.g. a regional, national or international meteorological organisation, data source or equivalent.

M3: Calculating water performance credits

The water consumption of the building is calculated in litres per person per day based on the data inputs for water-consuming components based on a default occupancy pattern determined by the building type.

Fittings that are added, replaced or upgraded should use the actual performance data for each fitting.

Fittings that are kept in situ should use the default performance figures in Table 75 below or the actual performance if available.

Where the assessment consists of multiple building types, a tailored occupancy pattern is generated for the building based on the floor area for up to five different building types.

Where blackwater, greywater, or rainwater systems are specified, their yield is used to offset non-wholesome water demand from components that would otherwise be from water supplied via public or private networks and/or abstracted from local water sources.

The baseline building has the same number of each type of water-consuming component present as the actual building. The baseline building is taken to have the same occupancy assumptions as the actual building, no waste-water systems installed, and with water-consuming components with baseline performance levels set as follows in Table 75 below.

Table 75: Baseline performance levels for water-consuming components

Water consuming component	Baseline performance level
WCs/toilet	6.0 litres effective flush volume
Urinal	8.75 litres/bowl/hour
Washbasin taps/faucet	10 litres/minute
Shower	12 litres/minute
Kitchen tap	10 litres/minute
Bath	200 litres
Dishwasher – domestic sized	17 litres/cycle

Water consuming component	Baseline performance level
Dishwasher – commercial sized	8 litres/rack
Washing machine – domestic sized	90 litres/use
Washing machine – commercial sized	14 litres/kg
Waste disposal unit	17 litres/minute

Where sanitary water-consuming components are unknown or not included in the project specification, they should be entered into the BREEAM Platform as having the baseline performance levels specified in Table 75 on the previous page. Where water-consuming components have a worse performance than the baseline level, the baseline as specified in Table 75 on the previous page should be entered into the BREEAM Platform.

In instances where there is a green lease agreement that includes specific clauses about the performance of water-consuming components that will be installed, these can be used in place of the baseline values.

Any water using components in areas not covered by the agreement must assume systems of baseline efficiency.

The water performance (litres/person/day) for the actual building and the baseline building are calculated within the BREEAM Platform which also determines the number of credits awarded in accordance with Table 73 on page 275.

M4: EU Taxonomy reporting

The BREEAM Platform also calculates whether all the installed water-consuming components meet the DNSH (Do No Significant Harm) requirements set for sustainable use and protection of water and marine resources for renovation works.

Compliance notes

Ref	Terms	Description
CN1	Flow rate for click taps	The flow rate for click taps shall be taken as the maximum flow rate, as quoted by the manufacturer, of the lower range before the water break or 'click'.
CN2	Washer dryers	Where a washer dryer is specified, the water consumption figure for the wash and dry cycle should be used. The drying cycle of a washer dryer is taken into account because it usually uses water during this drying process (e.g. for cooling during the drying cycle) and in some cases, this water usage can be significant.

Evidence

Criteria	Interim design stage	Final post-construction stage
All	The relevant sections or clauses of the building specification, design drawings or schedules confirming the number, specification and water consumption of all water-consuming components. Where specific products are specified, manufacturer's literature, EU Energy Label or European Unified Water Label information must be provided to support the water consumption values used. Technical details for blackwater, greywater, or rainwater collection systems, where specified. Calculations or measurement data e.g., relating the flow rate for push and automatic shut off taps or for blackwater, greywater, or rainwater collection systems.	Final construction drawings or sanitaryware schedule to confirm the number and type of water-consuming components installed. Assessor site inspection report with photographic evidence or proof of purchase such as purchase orders to confirm that the fittings have been installed as specified. Copy of the manufacturer's product details, EU Energy Label or European Water Label to confirm water consumption for all installed products. Technical details and calculations for installed blackwater, greywater or rainwater collection systems. Relevant clauses from green lease agreements.

Criteria	Interim design stage	Final post-construction stage
	Relevant clauses from green lease agreements.	

Definitions

Blackwater recycling

The appropriate collection, treatment and storage of wastewater discharged from kitchen and utility sinks, urinals and toilets to meet a non-wholesome water demand in the building, e.g. WC flushing, or other permissible non-wholesome water use on the site of the assessed building.

Click taps

Taps where the flow volume has more than one pre set level rather than permitting continuous adjustment.

Clinical areas

Areas of the building in which medical functions are carried out that require specific restricted environmental conditions, affecting factors such as such as humidity, daylighting, temperature etc. (e.g. X-ray, operating department, delivery room etc.).

Effective flush volume

The effective flush volume of a single flush WC is the volume of water used for one flush. The effective flush volume of a dual flush WC is the ratio of full flush to reduced flush. This is taken to be one full flush for every three reduced flushes for non-domestic buildings and one full flush for every two reduced flushes in domestic (residential) buildings or areas. The effective flush volume can therefore be calculated as follows, using a 6/4 litre dual flush volume WC as an example:

- Non-domestic: {(6 litre × 1) + (4 litre × 3)}/4 = 4.5 litre effective flushing volume (for a 6/4 dual flush WC)
- Domestic: {(6 litre × 1) + (4 litre × 2)}/3 = 4.67 litre effective flushing volume (for a 6/4 dual flush WC).

The differing ratio between non-domestic and domestic buildings reflects the different patterns of user behaviour between these building types.

Where buildings have both domestic and non-domestic function areas, conduct the calculations accordingly for the WCs specified in the relevant spaces. For example, in a hotel building, for WCs in hotel rooms use the 'domestic' effective flush volume calculation and for WCs in staff areas use the 'non-domestic' calculation.

Green lease agreement

A green lease agreement is a contract that includes additional clauses which provide for the management and improvement of the environmental performance of a building by both owners and occupiers. To be acceptable for BREEAM a green lease agreement must cover all relevant BREEAM requirements and must be signed by both the lessor and the lessee or, where the lessee is unknown, a commitment must be provided by the client that the green lease agreement will be implemented when the building is let.

Greywater recycling

The appropriate collection, treatment and storage of wastewater discharged from baths or showers, laundry rooms and similar to meet non-wholesome water demand in the building, e.g. WC flushing, or other permissible non-wholesome use on the site of the assessed building.

Hydraulic filter efficiency

This recognises the efficiency of the hydraulic filter. Where the coefficient for the system is not known a default value of 90% may be used.

Proportionate flow rate

The proportional flow rate can be calculated for multiple tap that takes account of the expected usage of each tap type.

Rainwater recycling

The appropriate collection and storage of rainwater run-off from hard outdoor surfaces to meet a non-wholesome water demand in the building, e.g. WC flushing, or other permissible non-wholesome water use on the site of the assessed building.

Surface yield coefficient

This recognises that some rainwater is lost due to splashing, evaporation, leakage, overflow and other factors and will vary depending on the surface from which the rainwater is collected. Where the coefficient for the system is not known a default value of 90% may be used.

Wholesome water

Water suitable for human consumption that meets the requirements of Section 67 (Standards of Wholesomeness) of the Water Industry Act 1991 is referred to as 'wholesome water'.

Additional information

Limitations of water consumption calculation

The building water use calculation uses default usage and occupancy rates to provide a benchmark of the typical consumption based on the specified fittings (in litres/person/day and m^3/person/year). Due to differences between the actual user behaviour and occupancy rates compared to the default values, the results of the method will not reflect the actual water use during building operation. Therefore, the results from the methodology should not be used to predict actual water consumption from a non-domestic building.

European Unified Water Label

The European Unified Water Label is a scheme initiated by bathroom manufacturers across the globe and it provides a database of bathroom products of different levels of water efficiency. It includes products by multiple European bathroom manufacturers and can help project teams identify products appropriate for their specifications. Find out more at: uwla.eu

Wat 02 Water monitoring

(all buildings)

Aim

To encourage the installation of water sub-meters to ensure water consumption can be monitored and managed in use.

Overview

Assessment type	Credits available	Minimum standards	Applicable assessment criteria
Part 1: Fabric and structure	0	None	Not applicable
Part 2: Core services	1	Good	All (see ref 1.0 and 3.0)
Part 3: Local services	1	None	All (see ref 1.0 and 3.0)
Part 4: Interior design	1	None	All (see ref 1.0 and 3.0)

Assessment type specific notes

Ref	Assessment type specific note
1.0	Criteria 2 to 4 only may be filtered out if the assessment zone for the refurbished building includes no in-scope water using systems or equipment.

Building type specific notes

Ref	Building type specific note
-	None

Issue specific notes

Ref	Issue specific note
3.0	**No water supply to the building or unit** If there is no installed water supply to the assessed building (because there will be no water-consuming fittings in the building in use), this issue will be filtered out.

Assessment criteria

One credit – Water monitoring

1 A water meter with a pulsed or other open protocol output is installed on all water supplied via public or private networks entering the building.

2 Water-consuming plant or building areas with significant water demand that are located within the assessment zone must be fitted with easily accessible sub-meters or have water monitoring equipment that is integral to the plant or area.

3 There is a water monitoring system that is appropriate for the size of the building.

3.a For buildings with a gross internal area ≥ 1000 m², the water meters are connected to a monitoring and management system.

3.b For buildings with a gross internal area < 1000 m², the water meters are either:

3.b.i Connected to an appropriate water monitoring and management system.

3.b.ii Accessible meters with pulsed outputs or other open protocol communication outputs.

4 Those responsible for monitoring the building's water consumption must be able to clearly identify the water uses and areas covered by each meter.

Methodology

M1: Scope

For criteria 1, the following water sources must be metered:

— Water supplied by network suppliers.
— Water supplied from private suppliers (including water supplied from a nearby building).
— Water supplies from boreholes.

Wastewater from blackwater, greywater, or rainwater collection systems are not metered for this issue.

M2: Significant water demand

The following water uses are deemed to be significant:

1. Swimming pools.
2. On sites with multiple units or buildings, e.g. shopping centres, apartment blocks, industrial units, retail parks etc. separate sub-meters are fitted on the water supply to the following areas (where present):
    a. For Residential Institutions with multiple self-contained dwellings, each dwelling counts as a significant water use.
    b. Common areas (e.g., covering the supply to toilet blocks).
    c. Service areas (covering the supply to outlets within storage, delivery, waste disposal areas etc.).
    d. Ancillary or separate buildings to the main development with a water supply.
3. Laboratory: in any building with a laboratory (or containing laboratories), a separate water meter is fitted on the water supply to any process or cooling loop for plumbed-in laboratory process equipment.

All other water consuming systems or building areas that are expected to account for more than 10% of the buildings total water demand must be considered when determining significant water uses.

The water metering strategy ensures that significant water uses in the building are separately monitored where it is technically feasible and cost effective to do so.

For this issue, metering is considered cost effective where the cost of installing a sub-meter is predicted to be fully recovered through the water cost savings arising from improved water management. This is over the expected lifetime of the building or system, whichever is shorter.

Examples where installing water metering may not be cost effective include:

1. Where a building has only one or two small sources of water demand (e.g. an office with sanitary fittings and a small kitchen).
2. Where the building has two sources of water demand, one significantly larger than the other, and the water consumption for the larger demand is likely to mask the smaller demand.

Compliance notes

Ref	Terms	Description
CN1	Existing water monitoring and management system on the same site	If the site on which the building is located has an existing water monitoring and management system that is managed by the same occupier or owner (as the refurbished building), the pulsed or digital water meters for the refurbished building may be connected to the existing water monitoring and management system.

Ref	Terms	Description
CN2	Remote monitoring systems	Remote monitoring and reporting services which report water consumption to the building user are acceptable in place of a separate water monitoring and management system.
CN3	Sub-metering by calculation / monitoring by difference	Direct meters may be used to estimate an unknown quantity by difference. For example, in a swimming pool with changing rooms: total water consumption is metered, and the swimming pool is metered. The difference between the two can be used to calculate water consumption for the changing rooms. Where a water monitoring and management system is used, the software should be capable of calculating and displaying all required end-uses in line with the criteria.
CN4	Domestic hot water supplied by a circulation loop	Where a circulation loop is used on the domestic hot water supply, only sub-meter the cold water supply should be metered. Sub-metering such systems may be impractical and the occupant can use the cold water meter readings as a proxy for overall water usage in relevant areas.

Evidence

Criteria	Interim design stage	Final post-construction stage
All	Calculations and justification relating to the identification of significant water demands. The relevant sections or clauses of the building specification or contract. Design drawings or metering schematics.	Calculations and justification relating to the identification of significant water demands. Assessor's site inspection report and photographic evidence. OR Final construction drawings or equivalent. Where applicable, manufacturer's product details to confirm pulsed output.

Definitions

Accessible meters

Water meters located for easy access to allow regular monitoring and readings by building occupants or facilities managers. Typically, this will be a plant room, main distribution room, or control room where a water monitoring and management system is installed.

Common areas

Shared facilities, spaces, and access that are not owned or controlled by a tenant or occupier. These are typically managed and maintained by the development's owner or managing organisation. Examples include atria, stairwells, entrance foyers and external areas.

Pulse outputs or other open protocol communication outputs

A pulsed output meter generates an output signal when a specified amount of electricity, water, or gas passes through it.

Acceptable alternatives must meet or exceed the capabilities of a pulsed output meter.

The following metering standards or technologies are currently recognised as alternative to pulsed output meters:

— M-bus (i.e. systems that comply with the EN 13757 series of standards). Also includes systems complying with OMS (Open Metering System) standards.

Water meters

Devices that measure the amount of water used on a circuit while water is flowing.

Primary meters measure main incoming water and are used for billing by the utility supplier. They include the principal smart and advanced utility meters to a site for electricity and gas.

Sub-meters are installed to measure consumption by specific items of plant or equipment, or to discrete physical areas, e.g. individual buildings, floors, tenanted areas or function areas.

Water monitoring and management systems

A water monitoring and management system provides users with data about water consumption patterns in a building to facilitate informed water management decisions.

In addition to providing real time data on water consumption they may also flag faults in equipment and in some cases remotely activate or deactivate equipment. They may have the ability to provide performance indicators that can be used to measure performance against targets and provide real time alerts in instances where water use is unexpected such as equipment left on after hours.

Additional information

None.

Wat 03 Water leak detection and prevention

(all buildings)

Aim

To reduce the impact of water leaks that may otherwise go undetected.

Overview

Assessment type	Credits available	Minimum standards	Applicable assessment criteria
Part 1: Fabric and structure	0	None	Not applicable
Part 2: Core services	up to 2	None	All (see ref 2.0, 2.1, 2.2, and 3.0)
Part 3: Local services	up to 2	None	All (see ref 2.0, 2.1, 2.2, and 3.0)
Part 4: Interior design	0	None	Not applicable

Assessment type specific notes

Ref	Assessment type specific note
-	None

Building type specific notes

Ref	Building type specific note
2.0	**Healthcare** Flow control devices criteria are not applicable to toilet facilities in clinical areas.
2.1	**Residential institution** The credit for the specification of flow control devices in WC areas or facilities does not apply to ensuite facilities in residential areas. For example: ensuite facilities in individual private bedrooms and a single bathroom for a collection of individual private bedrooms in halls of residence, key worker accommodation or sheltered accommodation.
2.2	**Short term stay residential institutions (such as hotels)** The credit for the specification of flow control devices in WC areas in hotel rooms can be achieved through providing the required flow control devices to groups of 10 rooms, rather than to each individual room.

Issue specific notes

Ref	Issue specific note
3.0	Where a building under assessment will have no water use in operation the whole issue is filtered out.
3.1	Where the scope of the refurbishment project does not include any WC areas, the Flow control devices credit is filtered out.

Assessment criteria

One credit – Leak detection system

1 Install a leak detection system capable of detecting a major water leak:

1.a On the utilities' water supply within the building, to detect any major leaks within the building.

AND

1.b Between the building and the utilities' water supply, to detect any major leaks between the utilities' supply and the building under assessment.

One credit – Flow control devices

2 Flow control devices that regulate the supply of water to each WC area or facility according to demand are installed.

Methodology

M1: Leak detection system

The leak detection must be either:

1. A permanent automated water leak detection system that alerts the building occupants to any leaks.

   OR

2. An inbuilt automated diagnostic procedure for detecting leaks.

It must be:

- Activated when the flow of water passing through the water meter or data logger is flowing above a pre-set maximum rate for a pre-set period. This usually involves installing a system which detects higher than normal flow rates at meters or sub-meters. It does not necessarily require a system that directly detects water leakage along a part of or the whole length of the water supply system.
- Able to identify different flow and therefore leakage rates. For example: continuous, high or low level, over set time periods. Although high and low-level leakage rates are not specified, the leak detection equipment installed must have the flexibility to distinguish between them. This allows is to be programmed to suit the building type and owner / occupier's usage patterns.
- Programmable to suit the owner / occupier's water consumption criteria.
- Where applicable, designed to avoid false alarms caused by normal operation of large water consuming plant such as chillers.

The leak detection requirements apply to all relevant water systems, regardless of the water source.

Where there is physically no space for a leak detection system between the utilities water meter and the building, alternative solutions can be used, provided that a major leak can still be detected.

For all pipework which is the responsibility of the building owner or occupier leak detection is required between the building and the utilities water meter. This requirement is applicable regardless of the length of the pipework.

For campus type developments or those with multiple buildings on the same site served by common pipework, leak detection is required both within the building and externally for the length of pipework that exclusively serves that building.

Where it can be demonstrated that alternative water leak detection technologies can meet or exceed the capabilities of systems set out in the leak detection requirements, subject to approval, these can also be considered compliant.

The following alternative solutions are currently recognised:

- Smart leak detection systems that are based on 'self-learning' (machine learning) to determine normal water use patterns are an acceptable alternative to systems that require manual pre-sets or manual programming.

M2: Flow control devices

For Part 2, criterion 2 only applies to WC areas in common areas, whilst for Part 3, criterion 2 only applies to WC areas in other areas of the building.

The criteria are applicable to the cold water supply only and include cold taps, WCs and urinals. Any solution implemented to achieve compliance with this issue should effectively mitigate the risk of hot-water scalding in showers, in the event that the cold water supply is shut off.

Flow control systems may control combined WC areas, such as male and female toilets within a core; they are not required for each individual sanitary appliance. However, all WCs must have either individual or block and group flow controls. The criteria are set to encourage the isolation of the water supply to each WC block when not in use.

The flow control criterion for this issue does apply to facilities which have only a single WC (potentially within smaller or low occupancy buildings). In these instances shut-off could be provided via the same switch that controls the lighting (whether proximity detection or a manual switch).

The following types of flow devices meet the criteria:

- A time controller, i.e. an automatic time switch device to switch off the water supply after a predetermined interval.
- A programmed time controller, i.e. an automatic time switch device to switch water on or off at predetermined times.
- A volume controller, i.e. an automatic control device to turn off the water supply once the maximum pre-set volume is reached.
- A presence detector and controller, i.e. an automatic device that switches water on and off, depending on the detection of occupancy or movement.
- A central control unit, i.e. a dedicated computer-based control unit for the overall management of a water control system, utilising some or all the types of control elements listed above.

Compliance notes

Ref	Terms	Description
CN1	Water utilities' meters	Where there is a water utilities' meter at the site or building boundary, it may be necessary to install a separate flow meter (or alternative measurement system) just after the utility meter to detect leaks; however, if the water utility company agrees to some form of leak detection being installed on their meter, this would also be acceptable.
CN2	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.
CN3	Building safety-critical systems, such as sprinklers and fire hydrants	For building safety-critical systems, such as sprinklers and fire hydrants, it may not be possible to fully meet the leak detection criteria. Where this is confirmed by an appropriate project team member, alternative approaches can be used. These must show how they meet the aim of the issue by detecting and alerting building management to major leaks.
CN4	Leak detection – recycled water use	The leak detection requirements still apply to all relevant water systems where water recycling systems are specified for WCs and urinals. Recycled water should be considered as a valuable resource as it replaces potable water use and, in many instances, recycling systems will still incorporate a mains-water back up.
CN5	Leak detection – using a BMS	A BMS can be used for leak detection purposes if it can be demonstrated that its integrated or add-on features meet all the requirements for a leak detection system.

Evidence

Criteria	Interim design stage	Final post-construction stage
All	The relevant sections or clauses of the building specification or contract. Design drawings or metering schematics. Where available, manufacturer's product details.	Assessor's site inspection report and photographic evidence. Final construction drawings or equivalent. Manufacturer's product details.

Definitions

Clinical areas

Areas of the building in which medical functions are carried out that require specific restricted environmental conditions, affecting factors such as humidity, daylighting, temperature etc. (e.g. X-ray, operating department, delivery room etc.).

WC areas or facilities

WC areas or facilities refers to cold water supply to taps, WCs, and urinals. The water supply system must not allow the cold water to automatically switch off in the showers while the hot water is still running to avoid scalding from hot water.

Additional information

None.

Wat 04 Water efficient equipment and systems

(all buildings)

Aim

To recognise and encourage the procurement of water efficient equipment and systems for applications other than sanitary use in buildings to reduce water consumption in operation.

Overview

Assessment type	Credits available	Minimum standards	Applicable assessment criteria
Part 1: Fabric and structure	0	None	Not applicable
Part 2: Core services	up to 3	None	All (see ref 3.0)
Part 3: Local services	up to 3	None	All (see ref 3.0)
Part 4: Interior design	up to 3	None	All (see ref 3.0)

Assessment type specific notes

Ref	Assessment type specific note
-	None

Building type specific notes

Ref	Building type specific note
-	None

Issue specific notes

Ref	Issue specific note
3.0	This issue will be filtered out where there are no systems and equipment that use significant amounts of water for non-sanitary purposes included within the scope of the assessment.

Assessment criteria

Up to three credits – Water efficient equipment and systems

1 Identify systems and equipment that use significant amounts of water for non-sanitary uses that are included in the scope of assessment (see M1).

2 Determine the percentage of in-scope non-sanitary water consumption to sanitary water consumption to determine the number of credits available, see Table 76 below.

Table 76: Credits available in Wat 04

In-scope non-sanitary water consumption / sanitary water consumption (%)	Credits available
No in-scope equipment or systems OR Water consumption of in-scope equipment and systems is not significant	0

In-scope non-sanitary water consumption / sanitary water consumption (%)	Credits available
< 20%	1
≥ 20%	2
≥ 40%	3

3 Demonstrate installed non-sanitary water-using systems and equipment are water efficient (see M2).

4 Determine the number of credits awarded based on the percentage of non-sanitary water demands that are provided by water efficient equipment, see Table 77 below.

Table 77: Credits awarded in Wat 04

Percentage of in scope non-sanitary water consumption that is provided by water efficient equipment	Percentage of available credits awarded
≥ 5% and <20%	20%
≥ 20% and <40%	40%
≥ 40% and <60%	60%
≥ 60% and < 80%	80%
≥ 80%	100%

Methodology

M1: Scope of non-sanitary water-using systems and equipment

The scope of water-using systems and equipment to be considered for this issue are those that are not assessed under Wat 01 Water consumption.

This includes but is not limited to:

- Swimming pools
- Recreational hot tubs and hydrotherapy pools
- External planting
- Water features
- Vehicle wash stations
- Cooling towers
- Systems that use water for cooling or heating
- Other systems and water-using components with an estimated water consumption of 1000 litres per year or more

Unless one or more of the following conditions apply:

1. They are part of an industrial process.
2. They provide temporary services.
3. They are only used when maintenance work is being carried out.
4. They are only used in an emergency.
5. There are overriding safety, security or accessibility requirements that prevent water efficiency criteria being met by any relevant compliance routes.
6. The equipment or system is a bespoke (unique) item that has been made specifically for the project and cannot be compared to standard equipment or systems.

For Part 2, water using equipment and systems situated in common areas or providing services to all areas of the building must be included in the scope of the assessment.

For Part 3, water using equipment and systems serving separate functional areas or separately tenanted areas must be included in the scope of the assessment.

For Part 4, any water using equipment and systems that are included as part of the fit out must be included in the scope of the assessment

Water-using systems and equipment for non-sanitary water uses may be excluded from the assessment where the additional cost of procuring water efficient systems or equipment is expected to exceed the cost savings from reduced water consumption over the lifetime of the system or equipment.

This is more likely to be the case for items with low annual water consumption.

M2: Estimating non-sanitary water used by in-scope systems and equipment

Water consumption estimates may be derived from engineering calculations, data for similar projects, benchmarks or other approximate estimation methods, or metered water consumption. For existing systems and equipment that fall within the scope of the assessment metered data may be used directly. Where systems or equipment have been replaced or refurbished metered data should be adjusted based on justified assumptions about the reduction in water consumption.

For example, a simple engineering calculation for a swimming pool might take account of the surface area of the pool and the evaporation rate, which will be determined by the difference between the water temperature and the air temperature and the ventilation rate.

The estimated annual water consumption for each in-scope system or type of equipment must be entered in the BREEAM Platform.

At the pre-assessment stage, the number of credits available may be estimated by entering a rough estimate of the total water consumption for all in-scope systems and equipment. This must be replaced by estimates of the water consumption for each system or item of equipment before the assessment is submitted. Where metered data is used, water consumption may be entered for multiple systems and equipment items.

M3: Determining the number of credits available

The methodology for calculating annual water consumption for in-scope non-sanitary water-using equipment and systems is described in M2.

Where predicted water consumption calculations have been undertaken, the annual sanitary water consumption should be calculated in accordance with Wat 05. Otherwise, the annual sanitary water consumption calculated for Wat 01 may be used.

The ratio of in-scope non-sanitary to sanitary water consumption is calculated as:

$$\frac{Annual\ non-sanitary\ water\ consumption\ for\ all\ in-scope\ systems\ and\ equipment}{Annual\ water\ consumption\ for\ sanitary\ water\ uses} \times 100$$

This is used to determine the number of credits available according to Table 76 on page 289.

M4: Demonstrating water efficiency

There are two routes for determining whether an item of equipment or system is water efficient:

1. Where the equipment or systems are more water efficient than that of a standard version of the equipment or system (see M4.1).

   OR

2. Where the equipment or system meets specific "deemed to comply" water efficiency requirements (see M4.2).

Deemed to comply water efficiency requirements are only provided for some types of systems and equipment.

Where deemed to comply requirements exist, the water efficiency compared to a standard version of the system or equipment may be used to demonstrate compliance with this issue.

M4.1: Demonstrating water efficiency compared to a standard version of the system or equipment

The reduction in water consumption must be calculated based on the expected annual water consumption for the actual system or item of equipment compared to annual water consumption of a standard system or item of equipment. In both instances, the system or item of equipment must meet the same water service demand.

A standard item of equipment is defined as having a water efficiency that is typical for that type of equipment. This means that it has:

— Water-using components with water efficiency that is typical for the component types.

— Water efficient features and controls that are typical for the system type.

— Not been designed to optimise water consumption.

The performance of a standard version of a system or equipment type might be determined based on a non-exhaustive search for systems or products of the same type.

To demonstrate that the actual equipment or system procured is more water efficient than the standard version, show that the performance of the actual equipment or system achieves a meaningful reduction in water consumption compared to the standard version.

Where technical data on both the actual and standard version of the system is readily available, this should be used to calculate the percentage reduction in water consumption. This calculation, alongside justification for both the selection of the standard product and the acceptance of the achieved percentage reduction over the standard product as meaningful, should be provided in each case to demonstrate that a given system is water efficient.

Note: The percentage reduction in water consumption does not impact the number of credits awarded.

M4.2: Deemed to comply requirements for water-using systems and equipment

Deemed to comply requirements for specific non-sanitary water-using systems and equipment are listed in Table 78 below.

Table 78: Deemed to comply requirements for non-sanitary water-using systems and equipment

Type of system or equipment	Requirements
Swimming pools	Automatic or semi-automatic pool covers, or 'liquid' pool covers with an automatic dosing system, are fitted to the entire pool surface area. AND For indoor pools: The air temperature in the pool hall can be controlled so that it is 1°C above the water temperature. OR For outdoor pools: Wind barriers, such as fencing, rocks, or shrubbery are used to reduce evaporation.
Recreational hot tubs and hydrotherapy pools	Automatic or semi-automatic pool covers, or 'liquid' pool covers with an automatic dosing system, are fitted to the entire pool surface area.
Planting and landscaping	Watering is by a controlled irrigation system that uses local weather data or soil moisture sensors. OR Reclaimed or recovered water from a rainwater collection or waste-water recovery system with appropriate storage, i.e. greywater collection from building functions or processes that use potable water, e.g. vehicle wash, sanitary facilities, irrigation etc. is used in preference to other water sources. OR External landscaping and planting that relies solely on precipitation, during all seasons of the year once the planting has been established (see CN1).
Water features such as decorative fountains	Automatic switch off during unoccupied hours. OR Wind barriers, such as fencing, rocks, or shrubbery are used to reduce evaporation.
Vehicle wash stations	Fitted with a water recycling system. OR Uses rainwater or waste-water.
Cooling towers	Automatic blowdown control which regulates when blowdown is discharged. OR Fitted with a windbreak, floating covers, or other types of enclosure.
Systems that use water for cooling or heating	Uses a closed loop water circulation system.

M5: Determining the number of credits achieved

The total annual water consumption of in-scope equipment is determined based on the estimated water data entered in the BREEAM Platform, as described in M2.

Where equipment is demonstrated to be water efficient in accordance with M4, this should be indicated in the BREEAM Platform.

The number of credits achieved is calculated in the BREEAM Platform as follows:

$$\frac{\textit{Annual non – sanitary water consumption by in – scope systems and equipment that are water efficient}}{\textit{Annual non – sanitary water consumption by in – scope systems and equipment}} \times \textit{Number of credits available}$$

Partial credits are rounded to the nearest whole number.

Compliance notes

Ref	Terms	Description
CN1	Temporary irrigation systems	Temporary watering arrangements set up purely to allow plant species or a green roof to establish are acceptable for plants relying on natural precipitation during all seasons of the year. Where this is the case, the ecologist's report must confirm the plant species and the expected time for recommended plant species to establish themselves i.e. time period for temporary watering arrangements.
CN2	Manual watering	Where the design team can justify that manual watering provides a reduction in unregulated water consumption, this can be considered as an acceptable method for reducing unregulated water use.
CN3	Using water from natural underground sources to offset water consumption	Water from natural underground sources (for instance aquifer water accessed via boreholes) cannot be used to offset water consumption. A significant amount of water used for public consumption is already drawn from aquifers. Private boreholes may be drawing water from the same sources as public utility companies.

Evidence

Criteria	Interim design stage	Final post-construction stage
1	Design drawings, relevant sections of the building specification, schedules or other documentary evidence identifying all water demands from uses other than domestic scale drinking and sanitary use components, as per M1. Where items with low annual water consumptions have been excluded from the scope due to the cost of replacement, this must be stated and justified.	Final construction drawings or equivalent, assessor site inspection report and photographic evidence or other documentary evidence to verify all water demands from uses other than domestic scale drinking and sanitary use components, as per M1, that have been installed. Where items with low annual water consumptions have been excluded from the scope due to the cost of replacement, this must be stated and justified.
2	Calculations and data sources used to demonstrate the estimated annual water consumption of systems and equipment, as per M2 and M3.	Final calculations and data sources used to demonstrate the estimated annual water consumption of installed systems and equipment, as per M2 and M3.
3	Where compliance demonstrated by comparison to a standard version of the system or equipment, acceptable evidence sources include: — Written justification for the selection and benchmarking of the standard product based on reasonable assumptions or basic market research. — Specific clauses from reports or manufacturer's literature relating to the water consumption of the actual product. — Specific clauses from reports or manufacturer's literature relating to the	Where compliance demonstrated by comparison to a standard version of the system or equipment, acceptable evidence sources include: — Manufacturer's literature relating to the water consumption of the actual installed systems or equipment — Final construction drawings / equipment schedules or equivalent, assessor site inspection report and photographic evidence or proof of purchase to verify installed systems or equipment.

Criteria	Interim design stage	Final post-construction stage
	water consumption of the standard product. Plus: — Where available, calculations showing that the actual product is more water efficient than the standard product. Where a percentage reduction in water consumption has been accepted as signifying a meaningful reduction in water efficiency, then this should be stated and justified. Where this is demonstrated by meeting the deemed to comply requirements within Table 78, acceptable sources of evidence include: — Relevant sections of the building specification, systems or equipment schedules or contract clauses. — Where products are specified, manufacturer's product details confirming they meet the deemed to comply requirements.	Plus: — Calculations showing that the actual product has a lower water consumption than the standard product. Where a percentage reduction in water consumption has been accepted as signifying a meaningful reduction in water efficiency, then this should be stated and justified. Where compliance is demonstrated by meeting the deemed to comply requirements, acceptable evidence sources include: — Final construction drawings / equipment schedules or equivalent, assessor site inspection report and photographic evidence or proof of purchase to verify installed systems or equipment. — Manufacturer's literature showing the equipment includes the deemed to comply requirements.

Definitions

Non-sanitary water uses

All operational water uses within the curtilage of the building **except** for:

- WCs/toilets
- Urinals
- Taps/faucets (on wash-hand basins, kitchen sinks, and waste disposal units)
- Showers
- Baths
- Dishwashers (domestic and commercial-sized)
- Washing machines (domestic and commercial sized)

Vehicle wash station

A commercial-scale automatic, semi-automatic, or manual system for washing vehicles. This includes wheel and chassis wash, fixed gantry and screen wash systems using brushes, spray or handheld jet hoses.

Additional information

None.

Wat 05 Prediction of operational water consumption

(all buildings)

Aim

This issue encourages and rewards estimating operational water consumption in use, the setting of a water performance target and commitment to measure operational water consumption in use.

Overview

Assessment type	Credits available	Minimum standards	Applicable assessment criteria
Part 1: Fabric and structure	0	None	Not applicable
Part 2: Core services	1 + 1 exemplary	None	All
Part 3: Local services	1 + 1 exemplary	None	All
Part 4: Interior design	0	None	Not applicable

Assessment type specific notes

Ref	Assessment type specific note
-	None

Building type specific notes

Ref	Building type specific note
-	None

Assessment criteria

One credit – Predict operational water consumption

1 Estimate the annual operational water consumption for the building or relevant Part (see M1).

One exemplary credit – Disclosing an in-use water performance target and commitment to measure water consumption in-use

2 Achieve the credit for predicting operational water consumption.

3 Achieve maximum available credits in Wat 02 Water monitoring.

4 An in-use water performance target has been disclosed to stakeholders and been made publicly available prior to practical completion.

5 The client or building occupier commits funds to pay for in-use water consumption measurement and reporting once the building is occupied. This requires a suitably qualified individual or organisation to be appointed and to measure and report on the actual in-use operational consumption.

Methodology

M1: Estimating annual operational water consumption

This issue should be applied to operational water consumption at the building level. It must be applied at the building level for Part 2 and 3 assessments. For Part 2 only or Part 3 only assessments where water consumption is sub-metered at a level that corresponds with the scope of the refurbishment the assessment may be carried out for the relevant Part. For Part 2, this would cover water-using components in common areas. For Part 3, this would cover water using components in tenanted or functional areas.

Where data on sanitary water-using components have been entered in the BREEAM Platform to calculate the number of credits awarded for Wat 01 this must be used to estimate sanitary water consumption for those components.

Where the Wat 01 assessment only considers Part 2 or Part 3, data for the additional water using components must be entered for Wat 05.

In Wat 01 standard occupancy assumptions are used to calculate the annual water consumption for sanitary water-using components. However, for this issue, the expected actual occupancy pattern for the building should be used to determine annual sanitary water consumption.

To facilitate this the following parameters must be entered into the BREEAM Platform.

- Number of occupied days per year
- Average number of occupiers per day
- Average occupancy hours per day

Where the intended occupier is known, this information should be obtained from the intended occupier, for example through structured interview.

Where no intended occupier has been identified, the occupancy patterns must be based on that of a similar project or a typical value for the building type.

The water consumption for non-sanitary water uses is estimated, identifying any systems and equipment that will need to be installed in the building when it is operational.

Like Wat 04, the scope of this issue includes water-using systems and equipment that are not assessed under Wat 01 Water consumption.

This includes but is not limited to:

- Swimming pools
- Recreational hot tubs and hydrotherapy pools
- External planting
- Water features
- Vehicle wash stations
- Cooling towers
- Systems that use water for cooling or heating
- Other systems and water-using components with an estimated water consumption of 1,000 litres per year or more.

Unless one or more of the following conditions apply

1. They are part of an industrial process.
2. They provide temporary services.
3. They are only used when maintenance work is being carried out.
4. They are only used in an emergency.
5. There are overriding safety, security or accessibility requirements that prevent water efficiency criteria being met by any relevant compliance routes.

Unlike Wat 04, all other water-using systems and equipment should be included for this issue, even where procuring water efficient systems and equipment would not be cost effective.

The estimates of water consumption can be based on typical benchmarks, simplified engineering calculations, data from similar projects, manufacturer's data, or on any other reasonable assumptions. Where metering permits, the water consumption may be based on annual water consumption pre-refurbishment adjusted to take account of post-refurbishment water reduction.

The predicted water consumption for sanitary water uses and non-sanitary water uses must be entered into the BREEAM Platform.

For items assessed under Wat 04, the same evidence may be used for this issue, but for other items the estimated annual water consumption for each non-sanitary water-using systems or equipment must be entered In the BREEAM Platform.

M2: Disclosing an in-use water performance target

The water target should be expressed as an annual water intensity normalised by floor area and per person.

The scope of water uses included in the target must be explicitly stated, for example, whole building, tenanted areas only, functional areas only, or common areas only.

In all cases the floor metric must be defined, for example GIA or NIA.

This information must be provided to building stakeholders e.g., prospective owners and occupiers of the building and be accessible to members of the public.

M3: Commitment to measure in-use water consumption

The funding for in-use water consumption measurement must be sufficient to cover monitoring of water consumption for the first 12 months once the building reaches the 80% occupancy threshold. Compare these to the predicted water consumption and any water targets set for the building.

This could be demonstrated by undertaking a BREEAM In-Use assessment of water consumption under Part 2.

Compliance notes

None.

Evidence

Criteria	Interim design stage	Final post-construction stage
Predict operational water consumption		
1	Documentation detailing all water-using components and equipment as identified in line with M1, such as specifications, design drawings or schedules. Metered water consumption data pre-refurbishment. Calculations and data sources used to confirm the overall estimated annual operational water consumption for the building. Where known, manufacturer's product details.	As built documentation detailing all water-using components and equipment as identified in line with M1, such as final construction drawings or schedules. Metered water consumption data pre-refurbishment. Final calculations and data sources used to confirm the overall estimated annual operational water consumption for the building including manufacturer's product details.
Disclosing and in-use water performance target		
4	Commitment from client to disclose the in-use water performance target to building stakeholders and members of the public. This should include what the target is, the scope of the water uses included and how this information will be made available.	Confirmation of the in-use water performance target, updated as required. Evidence to confirm how this has been made available to building stakeholders and members of the public, such as weblinks or other publicly accessible format.
Commitment to measure water consumption in use		
5	Confirmation from the client that funds have been committed to pay for in-use water consumption measurement and reporting.	Appointment of a suitably qualified individual or organisation, or BREEAM Assessor where BREEAM In-Use Part 2 is proposed.

Definitions

Non-sanitary water uses

All operational water uses within the curtilage of the building **except** for:

- WCs/toilets
- Urinals
- Taps/faucets (on wash-hand basins, kitchen sinks, and waste disposal units)
- Showers
- Baths
- Dishwashers (domestic and commercial-sized)
- Washing machines (domestic and commercial sized).

Occupancy threshold

This is determined based on the % floor area (GIA) that is in occupation.

Operational water consumption

This includes both sanitary and non-sanitary water uses.

Sanitary water uses

This covers water used by the following water-using components:

- WCs/toilets
- Urinals
- Taps/faucets (on wash-hand basins, kitchen sinks, and waste disposal units)
- Showers
- Baths
- Dishwashers (domestic and commercial-sized)
- Washing machines (domestic and commercial sized).

Suitably qualified individual or organisation

An individual or organisation with experience of carrying out water audits or in-use building performance assessments in accordance with legislation or voluntary measurement and reporting standards

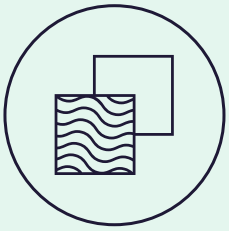
Vehicle wash station

A commercial-scale automatic, semi-automatic, or manual system for washing vehicles. This includes wheel and chassis wash, fixed gantry and screen wash systems using brushes, spray or handheld jet hoses.

Additional information

None.

Materials



Summary

This category encourages steps taken to reduce the impact of construction materials through design, construction, maintenance and repair. Issues in this section focus on the procurement of materials that are sourced in a responsible way and have a low embodied impact over their life including extraction, processing and manufacture, and recycling.

Assessment issues

Mat 01 Building life cycle assessment	up to 7 credits + 3 exemplary
Mat 02 Environmental product declarations	1 credit
Mat 03 Responsible sourcing of construction products	4 credits + 1 exemplary
Mat 05 Material efficiency	1 credit

Mat 01 Building life cycle assessment

(all buildings)

Aim

To optimise the use of materials and reduce the environmental burden of construction products over the life cycle of the building.

Overview

Assessment type	Credits available	Minimum standards	Applicable assessment criteria
Part 1: Fabric and structure	up to 7 + 3 exemplary	Excellent, Outstanding	All (see ref 1.0 and 2.0)
Part 2: Core services	up to 7 + 3 exemplary	Excellent, Outstanding	All (see ref 1.0 and 2.0)
Part 3: Local services	up to 7 + 3 exemplary	Excellent, Outstanding	All (see ref 1.0 and 2.0)
Part 4: Interior design	up to 7 + 3 exemplary	Excellent, Outstanding	All (see ref 1.0 and 2.0)
EU Taxonomy	-	-	1–9 (see M4)

Assessment type specific notes

Ref	Assessment type specific note
1.0	**Embodied carbon benchmark comparison** The benchmark credits (criterion 7) only apply to assessments that include all Parts 1–4 (fully fitted) or Parts 1–3.

Building type specific notes

Ref	Building type specific note
2.0	**Embodied carbon benchmark** Benchmark credits apply to the following building types: — Industrial — Office — Education — Retail — Residential institution All countries except UK: — Hospitality UK only: — Healthcare — Culture & Entertainment — Prisons
2.1	**Mixed use buildings (benchmark)** Where the assessed building is mixed use, the floor area for different building uses should be entered into the BREEAM Platform. This is to enable comparison with a floor area weighted benchmark.
2.2	**Part new build, part refurbishments** All criteria relevant to the building type and function apply.

Assessment criteria

Two credits – Early design LCA and embodied carbon reporting

1 Carry out an early design phase LCA calculation from the materials that the project incorporates into the building. The LCA must:

1.a Meet the requirements for tools and scope given in M1.

1.b Include relevant options appraisals, including a baseline assessment. There are no requirements to carry out a specific number of options appraisals for the project.

1.c Be used as a basis for choosing design solutions and materials with the aim of achieving a low environmental impact. If an alternative solution with a lower environmental impact has not been chosen, then this must be justified.

2 From the early design LCA results (criterion 1), report the embodied carbon emissions from materials used in the building. Results must be reported using the BREEAM Platform. To ensure consistency follow the requirements in M2.

One credit – Technical design LCA and embodied carbon reporting

3 Carry out a technical design phase LCA calculation from the materials that the project incorporates into the building. The LCA must:

3.a Meet the requirements for tools and scope given in M1.

3.b Include at least one assessment showing the evolving design and specification at technical design.

4 From the technical design LCA results (criterion 3), report the embodied carbon emissions from materials used in the building. Results must be reported using the BREEAM Platform. To ensure consistency follow the requirements in M2.

Two credits – Post-construction LCA and embodied carbon reporting

5 Carry out a post-construction phase LCA calculation from the materials that the project incorporates into the building. The LCA must:

5.a Meet the requirements for tools and scope given in M1.

5.b Include as-built specification at post-construction.

6 From the post-construction LCA results (criterion 5), report the embodied carbon emissions from materials used in the building. Results must be reported using the BREEAM Platform. To ensure consistency follow the requirements in M2.

Up to two credits (plus one exemplary credit) – Embodied carbon benchmark comparison

7 For relevant assessment and building types, compare the calculated embodied carbon emissions (modules A1-A5, B1-B5, C1-C4) against the benchmark (see Table 79). The comparison against the benchmark must use the latest embodied carbon calculation available:

7.a For interim design stage assessment:

7.a.i Technical design LCA

7.b For final post-construction stage assessment:

7.b.i Post-construction LCA

Table 79: Number of credits achieved for each benchmark band

Benchmark band	Credits
A	2 credits + 1 exemplary credit
B	2 credits
C	

Benchmark band	Credits
D	1 credit
E	
F	0 credits
G	
Benchmark not applicable	Credits filtered out

Benchmark values in $kgCO_2e/m^2$ for each band and building type are provided in the BREEAM Platform.

One exemplary credit – Third party verification

8 A suitably qualified third party verifies the building LCA work. The suitably qualified third party must:

8.a Produce a report describing how they have checked that the building LCA work accurately represents the designs under consideration for the:

8.a.i Early design phase, and

8.a.ii Technical design phase, and

8.a.iii Post-construction phase (only relevant if criteria 5 to 6 have been targeted)

8.b Itemise in the report the checks made for each LCA option. As a minimum, this must include the quality requirements shown in Table 80 in M3.

8.c Include in the report details of their relevant skills and experience and a declaration of their third-party independence from the project client and design team.

9 Any recommendations in the third-party verification report must be resolved and evidenced.

One exemplary credit – Embodied carbon public data disclosure

10 For each project phase where an LCA has been conducted, submit the LCA or carbon results and data to a relevant publicly available LCA or carbon database. If suitable local or national options are not available, submit to the Built Environment Carbon Database (BECD).

Methodology

M1: LCA and embodied carbon methodology and scope

The following sets out the minimum requirements and the scope of the LCA and embodied carbon calculations. For further guidance on the information below, please refer to Guidance Note 51.

M1.1: Tools

The project must use an LCA tool recognised by BREEAM. A list of these can be found in KBCN1118. These are LCA tools that are technically evaluated and deemed suitable for carrying out building LCA for this issue. Where a project team is considering using a building LCA tool that is not yet recognised by BREEAM, the assessor shall contact BRE as soon as possible to initiate the evaluation process. This process requires time and a fee, as well as the involvement and evidence from the tool owner.

To apply for a new tool to be evaluated, please contact: breeam@bregroup.com.

M1.2: Project stages

During design stage certification, credits are awarded for completing LCA / embodied carbon calculations during the early design phase (you must complete and submit the LCA to BREEAM within 20 working days after submitting for planning application) and technical design phase.

During post-construction stage certification, the LCA / embodied carbon calculations should be updated to reflect as-built data.

M1.3: Environmental indicators

Results must be submitted for all core environmental impact indicators that the tool or data permits. Indicators specified in EN 15978[72] and EN 15804[73] must be used. All BREEAM recognised LCA tools comply with EN 15978 and EN 15804 and offer a

suitable range of indicators for reporting. There is no requirement for this to be submitted in a specific format as long it includes all the relevant indicators.

M1.4: Life cycle stages

The following life cycle modules must be covered (based on EN 15978):

- Modules A1–A5: Product sourcing and construction stage.
- Modules B1–B5: Use stage (excluding B6–7).
- Modules C1–C4: End-of-life stage.
- Module D: Considering benefits and loads beyond the system boundary. This is required unless EN 15804:2019+A2 EPD data is not available for used products.

M1.5: Building elements

All building elements as set out in the BREEAM Platform that are within the scope of the assessment type must be included in any compliant LCA, whatever the project phase. The elemental breakdown structure of building elements is derived from RICS NRM 1 classification system level 2 and aligns with RICS Whole Life Carbon Assessment Standard, 2nd Edition. All BREEAM-recognised LCA tools automatically produce outputs aligned with the correct building elements' structure.

M2: Embodied carbon reporting

To ensure consistency in reporting, embodied carbon data must be completed in the BREEAM Platform as follows:

- Modules A1–A5, B1–B5, C1–C4 must be reported.
- Submit results in kilograms of CO_2e per square metre ($kgCO_2e/m^2$).
- For area measurements, use the Gross Internal Area (GIA) in square metres (m^2).
- Modules A1–A3 may be reported together.
- When possible, and if the tool used allows for it, report biogenic carbon from construction products (negative value) separately.
- Module D is required unless EN 15804:2019+A2 EPD data is not available for used products.

M3: Third party verification

For each LCA option, itemise in the report the checks made by the suitably qualified third party including, as a minimum, the quality requirements shown in Table 80 below. Additionally, the report should include an executive summary of the third-party verification findings.

The recommended best practice would be to conduct the third-party LCA verification at the end of each project stage, however this is not mandatory. It is, for example, acceptable for these to be verified as a single exercise, following post-construction. The third-party verification exemplary credit can still be achieved if the post-construction credits are not targeted (criteria 5 to 6). In this instance, verification only needs to be done at early design and technical design phase.

Table 80: LCA quality requirements

Item	Early design	Technical design	Post-construction
1. Elemental construction quantities	Estimates based on elemental benchmarks or design documents at early design stage.	Calculated quantities shown in design documents at technical design stage.	As-built quantities.
2. LCA or EPD data type	Generic or manufacturer specific data if specified.	In order of preference, the selection should go like this: 1. Product EPD from the manufacturer of the specific product you are planning to use, if available. 2. Generic data.	In order of preference, the selection should go like this: 1. Product EPD from the manufacturer of the specific product you used, if available.

Item	Early design	Technical design	Post-construction
			2. Generic data.
3. Product quantities (mass per unit of elemental construction)	Typical or generic values. Generic (non-project specific) elemental constructions may be used.	± 10% of quantities shown in design documents at technical design stage. All elemental constructions shall be created from individual products.	As built quantities.
4. Product transportation distances		Typical or generic values. Project-specific distances may be used where known.	Actual transport distances.
5. Product service lives		Typical or generic values or a reasonable estimate for the actual installation scenario.	Prediction of scenarios based on specific as-built data.
6. Site wastage	Typical or generic values.	Typical or generic values or a reasonable estimate.	Actual site wastage.
7. Site energy/water	Typical or generic values.	Typical or generic values or a reasonable estimate.	Actual site energy and water quantities.
8. Completion	Ensure all materials captured in the modelling are within the site red line boundary and EN 15978 / EN 15941 cut-off rules are applied (missing items must not add to more than 5% of the mass)		
9. Study period	50 years (All countries except UK) 60 years (UK only)	50 years (All countries except UK) 60 years (UK only)	50 years (All countries except UK) 60 years (UK only)
10. Recommendations	Ensure that the design team has provided feedback on design options and that these are documented.		-
11. Assumptions	Ensure that assumptions are clearly documented, including any data proxies, quantity and calculation assumptions and exclusions.		
12. Comparison with benchmark	Check that the benchmark comparison seems reasonable, large deviations from the benchmarks could be a sign of modelling errors, with under or over estimations.		
13. Outputs from LCA report	Results must be reported separately for each environmental indicator included. Modules A1–A5, B1–B5, C1–C4 must be reported (modules A1–A3 may be reported together). There is no requirement for the third-party LCA verification report to be submitted in a specific format as long it includes all the relevant information.		
14. GIA	Check modelled GIA is as referenced/calculated in design documentation. For offices, net internal area (NIA) can also be used as a secondary normalisation metric.		
15. Timing	Ensure that the LCA was completed at the correct time for the relevant life cycle stage.		

M4: EU Taxonomy

In addition to criteria 1–9, to fully comply with EU Taxonomy requirements, it will need to be confirmed that the following requirement has also been addressed:

— The life-cycle Global Warming Potential (GWP) of the building resulting from the refurbishment has been disclosed to investors and clients on demand.

Compliance notes

None.

Evidence

Criteria	Interim design stage	Final post-construction stage
LCA and embodied carbon reporting		
1, 3	A copy of the LCA results or output report from the tool including all the requirements specified in M1.	No further actions required post-construction; no additional evidence is required other than that listed for the design stage.

Criteria	Interim design stage	Final post-construction stage
	For the early design phase: Relevant options appraisals and baseline assessment. Evidence to demonstrate how the LCA has influenced the design.	
2, 4	In the BREEAM Platform, report and submit the embodied carbon data for the early design phase and the technical design phase.	No further actions required post-construction; no additional evidence is required other than that listed for the design stage.
5	Relevant section or clauses of the Employer's Requirements, contract documentation or a letter of commitment from the client or developer to complete a LCA on the as-built specification at post-construction.	A copy of the LCA results or output report from the tool including all the requirements specified in M1.
6	Relevant section or clauses of the Employer's Requirements, contract documentation, or a letter of commitment from the client or developer to report the embodied carbon at post-construction.	In the BREEAM Platform, report and submit the embodied carbon data for the post-construction phase.
Embodied carbon benchmark comparison		
7.a	The BREEAM Platform will calculate this automatically based on the evidence provided for criterion 4.	No further actions required post-construction; no additional evidence is required other than that listed for the design stage.
7.b	Relevant section or clauses of the Employer's Requirements, contract documentation or a letter of commitment from the client or developer to complete a benchmark comparison of the embodied carbon at post-construction.	The BREEAM Platform will calculate this automatically based on the evidence provided for criterion 6.
Third-party verification		
8, 9	Third-party report including all the requirements as per M3 with early design phase and technical design phase data, where completed at design stage. Evidence to confirm it was completed by a suitably qualified third party. Relevant section of the building specification or contract clauses or letter of commitment to carry out a third-party verification of the LCA at post-construction, and for early design phase and technical design phase LCAs where relevant.	Third-party report including all the requirements as per M3 with post-construction phase data, and early design phase and technical design phase data where completed post-construction. Evidence to confirm it was completed by a suitably qualified third party.
Embodied carbon public data disclosure		
10	Confirmation of registration and data submission from the relevant database for the early design phase and the technical design phase. Relevant section or clauses of the Employer's Requirements, contract documentation or a letter of commitment from the client or developer to register and submit data for the post-construction phase.	Confirmation of registration and data submission from the relevant database for the post-construction phase.

Criteria	Interim design stage	Final post-construction stage
EU Taxonomy		
M4	A commitment to disclose the life-cycle Global Warming Potential (GWP) of the building to investors and clients on demand.	Evidence to support that the life-cycle Global Warming Potential (GWP) of the building is available to be disclosed to investors and clients on demand.

Definitions

Baseline assessment

A baseline LCA provides an initial assessment for comparison with subsequent assessments, facilitating the effective tracking of the project's environmental impacts as it advances through different phases.

BREEAM embodied carbon benchmark

A BREEAM benchmark to represent the average (mean) embodied carbon impact of a given building type and used for scoring this issue. It is expressed in kilograms of CO_2e per square metre ($kgCO_2e/m^2$). It is calculated by taking a sample of buildings of a given use type, dividing each building's embodied carbon impact ($kgCO_2e$) by its functional quantity (m^2 of GIA), then working out the average of these results. Embodied carbon benchmarks include modules A–C (excluding B6–7).

Embodied carbon

The 'embodied carbon' emissions of an asset are the total GHG emissions and removals associated with materials and construction processes throughout the whole life cycle of an asset (Modules A1-A5, B1-B5, C1-C4).

Environmental Product Declaration (EPD)

For BREEAM compliance, an independently verified environmental label (i.e. ISO Type III label) according to the requirements of ISO 14025(74).

Options appraisals

Options appraisals or optioneering involves evaluating potential options to determine the most favourable solution, particularly during the early design phase. Partial LCAs can be conducted at this stage, focusing on major elements like structural components, to compare environmental impacts before final decisions are made. It is also important that a full project LCA is done during the early design phases to see where further improvements can be found at a strategic level while the design is still sufficiently flexible.

RICS New Rules of Measurement (NRM)

A standard set of measurement rules and guidance for the cost management of construction projects and maintenance works. For more information, visit www.rics.org.

Suitably qualified third party

For third-party verification, the verifier must demonstrate the following expertise and experience:

1. Knowledge of LCA sector including the following standards:
    a. EN 15978 *Sustainability of construction works. Assessment of environmental performance of buildings.*
    b. ISO 14040/14044

    This can be demonstrated by completing an appropriate training course. Examples of some available training courses are provided in Additional information on the next page.
2. Completion or verification of five different LCAs for paying customers in the last 2 years.
3. Knowledge of LCA data and EPDs.
4. Knowledge of regulations surrounding LCA and embodied carbon.

The verifier must include a CV demonstrating their experience and knowledge against the above requirements.

Third party

"A person or body that is recognised as being independent of the parties involved, as concerns the issue in question" (BS EN 15804:2012+A1:2013).

The third-party verifier must be independent of the LCA assessor and demonstrate impartiality (for general principles, see ISO 17029). To qualify as a third party, the verifier must belong to an organisation not involved in the project and must not provide advice to the project, as this could compromise their impartiality during verification.

Additional information

Additional guidance on LCA and whole life carbon

UK:

- RICS Whole life carbon assessment (WLCA) for the built environment, 2nd Edition
- LETI Embodied Carbon Primer

France:

- Réglementation environnementale RE2020

USA:

- Embodied Carbon Harmonization and Optimization (ECHO) Project
- AIA-CLF Embodied Carbon Toolkit for Architects
- AGC PLAYBOOK on Decarbonization & Carbon Reporting in the Construction Industry (PDF)

Global:

- WGBC Bringing embodied carbon upfront (PDF)

Examples of relevant LCA training courses

- CIBSE Lifecycle Carbon Assessment (LCA) Foundation Training
- Circular Ecology: Life Cycle Assessment (LCA) Training Course
- MIT Professional Education: Life Cycle Assessment
- One Click LCA: Construction LCA Bootcamp
- RICS: Certificate in Whole Life Carbon Assessment Training Programme

Mat 02 Environmental product declarations

(all buildings)

Aim

To encourage availability of robust and comparable data on the impacts of construction products through the provision of environmental product declarations (EPD).

Overview

Assessment type	Credits available	Minimum standards	Applicable assessment criteria
Part 1: Fabric and structure	1	None	All
Part 2: Core services	1	None	All
Part 3: Local services	1	None	All
Part 4: Interior design	1	None	All

Assessment type specific notes

Ref	Assessment type specific note
-	None

Building type specific notes

Ref	Building type specific note
-	None

Assessment criteria

One credit – Product specification

1 Specify construction products with EPDs that achieve a total EPD points score of at least 20, according to M1.

2 Enter the details of each EPD in the BREEAM Platform, including the material category classification. The EPD points score and the number of credits achieved will be calculated automatically.

Methodology

M1: Total EPD points score methodology

In the BREEAM Platform, the total EPD points score shall be calculated as follows:

1. For each EPD, find and select the applicable material classification for the construction product as per Table 82 on the next page. If a construction product comprises more than one material, select the material category classification representing most of the construction product (by volume).
2. For each EPD that is applicable to a specified construction product, select the relevant EPD type as shown in Table 81 on the next page.
3. The BREEAM Platform will add together the EPD points calculated for each material classification to obtain the total EPD points score.

Table 81: EPD points for different types of EPD

Recognised types of EPD	Validity	EPD points
EPD applicable to more than one product in the same product category, and more than one manufacturer.	— EPD unexpired at the point of specification. — Product installed in the building by the end of construction. — EPD issued or registered by an ISO 14025 compliant programme operator. — For products covered by the Construction Product Regulations, the EPD must have been generated using product category rules based on BS EN 15804.	0.5
EPD applicable to more than one product in the same product category, and a single manufacturer.		0.75
EPD applicable to a single product*, and a single manufacturer (the product may be manufactured in more than one location) *Or variations of a single product that only differ in terms of colour or pattern.		1.5

Table 82: Material classification

Ref	Material category	Uniclass 1.4 codes (for information)
1	Timber or timber-based products	P5
2	Concrete or cementitious	P2*
3	Metal	P4
4	Stone or aggregate	P1, P3*
5	Clay-based	P33
6	Gypsum	P232
7	Glass	P314
8	Plastic, polymer, resin, paint, chemicals and bituminous	P7, P34
9	Animal fibre or skin, cellulose fibre	P6
10	Other	P8
*Except subsets listed separately. For example, P2 generally relates to 'Concrete or cementitious' except for the subset P232 which relates to 'Gypsum'.		

Compliance notes

Ref	Terms	Description
CN1	EPD for systems of products always installed together	Where an EPD is for a system of products from the same manufacturer that are always installed together, this system of products shall be considered a single product for the purposes of assessment in BREEAM. Examples of this include: — a flooring system of products comprising of the floor finish and an adhesive. — a cladding system of products comprising panels, fixing brackets, insulation, and seals etc.
CN2	EPDs' validity	EPDs which have expired or are pending verification at the time of specification cannot score points. However, it is not necessary that they are valid at the time of the design or post-construction stage submissions. BREEAM is primarily trying to encourage designers to take EPDs into consideration when specifying products.
CN3	EPDs – Products containing multiple materials	Construction products can comprise of either a single material, or multiple materials. Where a product (with an EPD) is comprised of more than one material, the assessor should decide which material category classification should be used for classifying the EPD at their own discretion, and in accordance with the categories listed in Table 82 above. To do this, the assessor should base the EPD classification on the material that represents most of the product's volume in accordance with the categories listed in Table 82 above.

Ref	Terms	Description
		For example, if a product comprises 0.8 m^3 of metal and 0.6 m^3 of glass, then the classification to use for the EPD is "Metal". Other reasonable approaches may be used. Whatever approach is used, it must be applied consistently across all EPD classifications.

Evidence

Criteria	Interim design stage	Final post-construction stage
All	Relevant section of the building specification or schedule confirming materials or products which will have EPDs. Where products are specified at design stage, copies of EPD certificates to be provided.	Updated schedule to confirm products specified with EPDs. Copies of all EPD certificates and robust post-construction evidence to confirm the specified materials have been installed. Robust post-construction evidence to verify proof of purchase for all materials with EPDs such as delivery tickets, invoices, purchase orders, confirmation from suppliers or site photographs.

Definitions

Construction product

A product with a manufacturer reference number that is specified by the designer (e.g. architect, engineer, interior designer, quantity surveyor, landscape architect etc.) or selected by the constructor (principal or sub-contractor), and installed on the project.

For further information on the definition of a 'construction product' in Mat 02, see KBCN1142.

Environmental Product Declaration (EPD)

For BREEAM compliance, an independently verified environmental label (i.e. ISO Type III label) according to the requirements of ISO 14025.

Additional information

None.

Mat 03 Responsible sourcing of construction products

(all buildings)

Aim

To ensure construction products that end up in the completed asset minimise negative environmental, economic, and social impacts across their supply chain.

Overview

Assessment type	Credits available	Minimum standards	Applicable assessment criteria
Part 1: Fabric and structure	4 + 1 exemplary	Pass	All
Part 2: Core services	4 + 1 exemplary	Pass	All
Part 3: Local services	4 + 1 exemplary	Pass	All
Part 4: Interior design	4 + 1 exemplary	Pass	All

Assessment type specific notes

Ref	Assessment type specific note
-	None

Building type specific notes

Ref	Building type specific note
-	None

Assessment criteria

Prerequisite – Legally harvested and traded timber

1 All timber and timber-based products used on the project are Legally harvested and traded timber.

One credit – Enabling sustainable procurement

2 A sustainable procurement plan must be used by the design team to guide specification towards sustainable construction products. The plan must:

2.a Be in place before the end of Concept Design.

2.b Include sustainability aims, objectives, and strategic targets to guide procurement activities. Targets do not need to be achieved for the credit to be awarded at post-construction stage but justification must be provided for targets that are not achieved.

2.c Include a requirement for assessing the potential to procure construction products locally. There must be a policy to procure construction products locally where possible.

2.d Include details of procedures in place to check and verify the effective implementation of the sustainable procurement plan.

2.e The documented policy and procedure must be disseminated to all relevant internal and external personnel and included within the construction contract to ensure that they are enforceable on the assessed project.

In addition, if the plan is applied to several sites or adopted at an organisational level it must:

2.f Identify the risks and opportunities of procurement against a broad range of social, environmental, and economic issues following the process set out in ISO 20400:2017.

Up to three credits (plus one exemplary credit) – Measuring responsible sourcing

3 In the BREEAM Platform, use the Mat 03 calculator and follow M1 to determine the number of credits achieved for the construction products. Credits are awarded in proportion to the number of points achieved, as set out in Table 83 below.

Table 83: BREEAM credits available for percentage of points achieved

Credits achieved	% of available points achieved
1 credit	≥ 10%
2 credits	≥ 20%
3 credits	≥ 30%
3 credits + 1 exemplary credit	≥ 50%

The number of material categories assessed defines the total number of points available. There are 10 material categories listed in Table 89 on page 316 and each material category is worth a maximum of 10 points.

Example: If the building contains three material categories (timber, metal, and concrete), then the maximum available points is 30 points (3 × 10). The credit scoring is then based on this total:

- 1 credit = 10% of 30 points = 3 points
- 2 credits = 20% of 30 points = 6 points

Methodology

M1: Assessment process for the Mat 03 calculator

In the BREEAM Platform, the Mat 03 calculator can be completed in two ways:

- When material quantities are not available (Route 1).
- When material quantities are available (Route 2). This methodology will proportionally weight the individual material scores to give a more representative assessment.

A mixture of both routes can be used in a single assessment if material quantities are available for some material categories but not others. Only one route can be used per material category.

To assess this issue there are up to three types of data needed for each product:

- Material category.
- Responsible sourcing certification scheme (RSCS) or environmental management system (EMS) certifications. A list of BREEAM-recognised RSCS and EMS schemes and applicable point scores can be found in Guidance Note 18.
- Product or material quantities (optional, Route 2 only).

To determine the number of credits that are achieved for responsible sourcing of construction products, the Mat 03 calculator must be completed with all the relevant information. Each construction product must be entered in the calculator individually (unless it is below the relevant cut-off threshold as per M6).

In the BREEAM Platform, the following principles apply to the Mat 03 calculator:

- The quantity of a product has not been worked out (Route 1).
- The quantity of a product has been worked out (Route 2).

— It may be the case that across an assessment there will be a combination of routes for construction products. For example, Route 1 may be used for the 'timber or timber-based' category and Route 2 for the 'metal' category.

— Only one route may be used per material category.

— Where construction products or materials are subject to a performance specification and a specific manufacturer and certificate reference cannot be provided, the missing details should be completed as 'tbc'.

The following steps outline the process to be followed to determine the number of credits achieved for responsible sourcing using the Mat 03 calculator:

1. Based on the scope of assessment parts, identify the in-scope construction products according to the Mat 03 location areas as shown in M2 and exclude any construction products that are below the cut-off thresholds (as given in M6).
2. For each product, identify the materials that you estimate make up most of the product (≈80% by volume). If the remaining 20% could contribute to the overall score you may include at your discretion. Identify which of the ten material categories listed in Table 89 on page 316 are included in the scope of the Mat 03 calculator and which are excluded from the assessment.
3. Obtain and identify any relevant BREEAM-recognised responsible sourcing certification scheme (RSCS) or environmental management system (EMS) certifications for each product. If there is more than one material within a product, identify all materials until you cover most of the product (≈80% by volume). A list of BREEAM recognised RSCS and EMS schemes and applicable point scores can be found in Guidance Note 18. The score is zero if a construction product has no certification, is non-compliant with broken chain requirements, or has a certification type that is not listed in Guidance Note 18.
4. When a material has been identified to be in scope, select whether the materials quantities are known or unknown.
5. For each product, enter the data into the Mat 03 calculator, including: 'Location category', 'Product name', 'Manufacturer', 'RSCS scheme' and 'Certification reference'. The Mat 03 calculator points will be added based on the RSCS scheme for each product and the quantity of each product (within material categories where all quantities are known).
6. The Mat 03 calculator collates all scores and shows the credits awarded.

Additional guidance on demonstrating compliance with the criteria in Mat 03 can be found in Guidance Note 24.

M2: Scope of assessment

The tables below indicate the New Rules of Measurement (NRM) classifications that must be included in the scope of the RF assessment parts. All construction products that are installed as part of one or more of these relevant building elements are in-scope and must be included in the BREEAM Mat 03 calculator. In some cases, products associated with a given NRM classification may be associated with multiple RF assessment parts.

Table 84: In-scope building elements for Part 1: Fabric and structure

In-scope (based on New Rules of Measurement (NRM) classification system)		
1 Substructure	1.1 Substructure	1.1.1 Standard foundations
		1.1.2 Specialist foundation systems
		1.1.3 Lowest floor construction
		1.1.4 Basement excavation
		1.1.5 Basement retaining walls

In-scope (based on New Rules of Measurement (NRM) classification system)		
2 Superstructure	2.1 Frame	2.1.1 Steel frames
		2.1.2 Space decks
		2.1.3 Concrete casings to steel frames
		2.1.4 Concrete frames
		2.1.5 Timber frames
		2.1.6 Other frame systems
	2.2 Upper floors	2.2.1 Floors
	2.3 Roof	2.3.1 Roof structure
		2.3.2 Roof coverings
		2.3.3 Specialist roof systems
		2.3.5 Rooflights, skylights and openings
	2.4 Stairs and ramps	2.4.1 Stair or ramp structures
	2.5 External walls	2.5.1 External enclosing walls above ground floor level
		2.5.2 External enclosing walls below ground level
		2.5.3 Solar or rain screening
	2.6 Windows and external doors	2.6.1 Windows – vertical
		2.6.2 Windows – roof or horizontal
		2.6.3 External doors
	2.7 Internal walls and partitions	2.7.1 Walls and partitions
	2.8 Internal doors	2.8.1 Internal doors
8 External works*	8.2 Roads, paths and pavings	8.2.1 Roads, paths and pavings
		8.2.2 Special surfacings and pavings
*Include hard landscaping that is installed as part of the project under assessment and: — Is within a defined curtilage of the building. — Or is clearly more associated with it (for example, an access road or car park that is intended to serve only the building under assessment or the building and, to a lesser extent, other buildings). Hard landscaping with no such distinction shall be excluded.		

Table 85: In-scope building elements for Part 2: Core services

In-scope (based on New Rules of Measurement (NRM) classification system)		
5 Services	5.5 Heat source	5.5.1 Heat source
	5.6 Space heating and air-conditioning	5.6.1 Central heating
		5.6.3 Central cooling
		5.6.5 Central heating and cooling
		5.6.7 Central air-conditioning
	5.7 Ventilation	5.7.1 Central ventilation
		5.7.3 Smoke extract or control
	5.9 Fuel installations and systems	5.9.1 Fuel storage
		5.9.2 Fuel distribution systems

Table 86: In-scope building elements for Part 3: Local services

In-scope (based on New Rules of Measurement (NRM) classification system)		
5 Services	5.5 Heat source	5.5.1 Heat source
	5.6 Space heating and air-conditioning	5.6.2 Local heating
		5.6.4 Local cooling
		5.6.6 Local heating and cooling
		5.6.8 Local air-conditioning
	5.7 Ventilation	5.7.2 Local ventilation
		5.7.3 Smoke extract or control
	5.9 Fuel installations and systems	5.9.1 Fuel storage
		5.9.2 Fuel distribution systems

Table 87: In-scope building elements for Part 4: Interior design

In-scope (based on New Rules of Measurement (NRM) classification system)		
2 Superstructure	2.7 Internal walls and partitions	2.7.1 Walls and partitions
	2.8 Internal doors	2.8.1 Internal doors
3 Internal finishes	3.1 Wall finishes	3.1.1 Finishes to walls
	3.2 Floor finishes	3.2.1 Finishes to floors
		3.2.2 Raised access floors
	3.3 Ceiling finishes	3.3.1 Finishes to ceilings
		3.3.2 False ceilings
		3.3.3 Demountable suspended ceilings
4 Fittings, furnishings and equipment	4.1 Fittings, furnishings and equipment	4.1.1 General fittings, furnishings and equipment
		4.1.2 Kitchen equipment
		4.1.3 Specialist fittings, furnishings and equipment

For each New Rules of Measurement (NRM) classification, the respective location category in the Mat 03 calculator is provided in Table 88 below. The calculator will automatically assign the location category based on the NRM classification chosen.

Table 88: BREEAM location categories

New Rules of Measurement (NRM) classification	Equivalent BREEAM location category
1.1 Substructure	Structure primary & secondary
2.1 Frame	Structure primary & secondary
2.2 Upper floors	Floor (including floor finishes)
2.3 Roof	Roof (including roof finishes)
2.4 Stairs and ramps	Structure primary & secondary
2.5 External walls	External wall (including finishes, e.g., cladding, lining, render)
2.6 Windows and external doors	Door or window
2.7 Internal walls and partitions	Internal partition or internal walls (including finishes)
2.8 Internal doors	Door or window
3.1 Wall finishes	Internal partition or internal walls (including finishes)
3.2 Floor finishes	Floor (including floor finishes)
3.3 Ceiling finishes	Ceiling (including ceiling finishes)
4.1 Fittings, furnishings and equipment	Fittings, furnishings and equipment
5.5 Heat source	Building services
5.6 Space heating and air-conditioning	Building services
5.7 Ventilation	Building services
5.9 Fuel installations or systems	Building services
8.2 Roads, paths and pavings	Hard landscaping

M3: Material categories

For the BREEAM Mat 03 calculator every construction product must be classified according to one of the material categories in Table 89 below. Where unclear, choose the closest matching category.

Table 89: Material categories

Ref	Material category
1	Timber or timber-based products
2	Concrete or cementitious
3	Metal
4	Stone or aggregate
5	Clay-based
6	Gypsum
7	Glass
8	Plastic, polymer, resin, paint, chemicals and bituminous
9	Animal fibre or skin, cellulose fibre
10	Other

M4: Approach to building services

BREEAM recognises that obtaining responsible sourcing information on building services can be more complicated and more difficult than with other construction products.

A simplified approach for construction products used in building services has been set out in Guidance Note 24 (GN24).

M5: Broken chain

There will be situations where a product or material specified by the design team (or chosen by the constructor) is certified at the manufacturing stage, but is supplied by one or more organisations that have no relevant certification. This is known as a broken chain. For example, this applies where a fabricator, without certification, is using material from a certified source or where a certified product or material is supplied to site by a non-certified supplier.

To recognise responsible sourcing certification where it does exist in the supply chain, while reducing the risks associated with a broken chain, it is permissible to use the upstream certification score in the Mat 03 calculator where the downstream risk to responsible sourcing is considered to be low.

Specifically, all organisations without responsible sourcing certification must show that they:

1. Only handle or transport materials, or
2. Only fabricate, assemble, or install materials, and
    a. Have a recognised quality management system that ensures there is no mixing or substitution of certified material with uncertified material.
    b. Are operating in jurisdictions that can demonstrate relatively robust and well enforced environmental, social and economic controls such as:
        i. Countries that are EU members.
        ii. States that have declared adherence to the OECD Guidelines for Multinational Enterprises.

For more guidance on broken chains, see Guidance Note 24 (GN24).

M6: Cut-off thresholds

Any construction product with a volume less than the cut-off threshold shown in Table 90 on the next page is excluded from the assessment for Mat 03. The volume considered should be taken as the construction product's overall external dimensions, including any internal voids and air spaces.

Minor fixings (brackets, nails, screws, etc.), adhesives, seals and ironmongery would normally fall below these thresholds. For further guidance, see M7.

Construction products that are below the cut-off volume do not need to be listed in the Mat 03 calculator.

Table 90: Cut-off thresholds for products and materials in Mat 03

Location category	Cut-off volume
Internal partition or internal walls (including finishes)	Any product less than 0.33 m^3 per 1000 m^2 of gross internal area (GIA)
Ceiling (including ceiling finishes)	Any product less than 0.33 m^3 per 1000 m^2 of GIA
All other location categories	Any product less than 1 m^3 per 1000 m^2 of GIA

M7: Quantities precision

The degree of tolerance accepted for estimating quantities is ±20% of the final installed quantity. This allows estimates to be made quickly and without calculations.

The assessor does not need to submit calculations to justify estimates – this applies to both in-scope construction products, and to cut-off volume estimations.

Compliance notes

Ref	Terms	Description
CN1	Limitations on using Route 2	Route 2 for a material can only be used when all the materials in that classification (e.g. all timber, all metal etc): — All have quantity information available AND — All quantity information is measured in consistent units that allow weighting (they are all by volume, or all by weight).
CN2	Scope of the issue	This issue excludes any materials used to help with construction, but do not become part of the finished building. This means the issue excludes materials that make up: — Temporary structures. — Temporary scaffolding, site hoarding, formwork etc.
CN3	Legally harvested and traded timber – USA and Canada	For projects in the USA and Canada, compliance with the prerequisite (legally harvested and traded timber) can be demonstrated using the ASTM D7612-21 standard.

Evidence

Criteria	Interim design stage	Final post-construction stage
Prerequisite – Legally harvested and traded timber		
1	Relevant section of the building specification or contract clauses.	Where certified materials were used, copies of all relevant certificates or chain of custody evidence. Robust post-construction evidence to verify proof of purchase such as delivery tickets, invoices, purchase orders, confirmation from suppliers or site photographs.
Enabling sustainable procurement		
2	A copy of the Sustainable Procurement Plan. Evidence to show the plan forms part of the construction contract. Relevant section of the building specification, contract clauses or letter of commitment to	Evidence demonstrating the effective implementation of the Sustainable Procurement Plan.

Criteria	Interim design stage	Final post-construction stage
	confirm how the plan will be disseminated to all relevant internal and external personnel.	
Measuring responsible sourcing		
3	Relevant sections of the building specification, summary or schedule confirming all materials within the project, those to be responsibly sourced and to what level. Where products are specified at design stage, copies of responsible sourcing certificates to be provided.	Updated schedule to confirm materials used within the building. Copies of responsible sourcing certificates. Robust post-construction evidence to verify proof of purchase for all materials responsibly sourced such as delivery tickets, invoices, purchase orders, confirmation from suppliers or site photographs.

Definitions

BREEAM Mat 03 calculator

An online calculator used to determine the number of BREEAM credits achieved for this issue.

BREEAM-recognised responsible sourcing certification schemes (RSCSs)

Third party schemes recognised under BREEAM. For information on how schemes are evaluated and recognised, refer to Guidance Note 18 (GN18).

Construction product certificates are used to confirm compliance to the requirements. Where a valid certificate is not available from the manufacturer, claims may be confirmed via the relevant responsible sourcing scheme provider. Many certification scheme organisations list companies and construction products that have been certified against their standards, including the scope of the certification. Some schemes will provide downloadable copies of the certificate which can be used as evidence of compliance for this issue.

Constituent product

A manufacturer-specific product (i.e., with a manufacturer reference number) that is not specified by the designer or the constructor but is used in the manufacture of another specified product.

Construction product

A manufacturer-specific construction product (i.e., with a manufacturer reference number) that is specified by the designer (e.g., architect, engineer, interior designer, quantity surveyor, landscape architect etc.) or selected by the constructor (principle or sub-contractor) and installed on the project.

Legally harvested and traded timber

For all countries except UK:

Legally harvested timber and wood-derived products are those that originate from a forest where the following criteria are met:

1. The forest owner or 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 and safety
    e. Other parties' tenure and use rights
    f. All relevant royalties and taxes are paid
3. There is full compliance with the criteria of CITES.

Legally traded means timber or products derived from Legally harvested timber were:

1. Exported in compliance with exporting country laws governing the export of timber and timber products, including payment of any export taxes, duties or levies.
2. Imported in compliance with importing country laws governing the import of timber and timber products, including payment of any import taxes, duties or levies.
3. Traded in compliance with legislation related to the convention on international trade in endangered species (CITES), where applicable.

UK only:

BREEAM follows the UK government's definition of legal and sustainable timber, as outlined in the Central Point of Timber (CPET) 5th Edition of the UK Government Timber Procurement Policy (TPP). At the time of writing, the policy requires all timber and wood-based products to be covered by at least one of the following (but the webpage below should be checked for changes):

1. Third party, independent forest certification schemes – Category A (e.g. FSC or PEFC).
2. Evidence on a case-by-case basis in line with the Framework for Evaluating Category B evidence – Category B.

For the avoidance of doubt, 100% of the timber and timber-based products must be compliant.

Further information on the UK Government's TPP and compliant responsible sourcing certification schemes is available from: www.gov.uk/guidance/timber-procurement-policy-tpp-prove-legality-and-sustainablity.

New Rules of Measurement (NRM)

A standard set of measurement rules and guidance for the cost management of construction projects and maintenance works. For more information visit: www.rics.org.

Responsible sourcing

The act of applying and managing sustainable development principles in the specification, procurement, and tracing of construction products. In BREEAM, this is demonstrated through auditable third-party certification schemes. For an up-to-date table of BREEAM-recognised RSCSs, refer to Guidance Note 18 (GN18).

Responsible sourcing certification scheme point scores

A graded scale to reflect the rigour of the RSCS. Used for awarding credits in this issue. For an up-to-date table of BREEAM-recognised RSCSs, refer to Guidance Note 18 (GN18).

Route 1

A route that does not measure the quantities of each construction product for the Mat 03 calculator. Compared to Route 2, this results in a potentially lower score. For further details, see M1.

Route 2

A route that measures the quantity of each construction product within a material category in the Mat 03 calculator. The improvement in rigour means a potentially higher score than Route 1. For further details, see M1.

Sustainable procurement plan

A plan that sets out a clear framework for the responsible sourcing of construction products to guide procurement throughout a project, for everyone involved in this process. The plan may be prepared and adopted at an organisational level or be site or project specific.

Additional information

None.

Mat 05 Material efficiency

(all buildings)

Aim

To avoid unnecessary materials use arising from over specification without compromising structural stability, durability or the service life of the building.

Overview

Assessment type	Credits available	Minimum standards	Applicable assessment criteria
Part 1: Fabric and structure	1	None	All
Part 2: Core services	1	None	All
Part 3: Local services	1	None	All
Part 4: Interior design	1	None	All

Assessment type specific notes

Ref	Assessment type specific note
-	None

Building type specific notes

Ref	Building type specific note
-	None

Assessment criteria

One credit – Material efficiency

1 At the Preparation and Brief and Concept Design stages, set targets and report on opportunities and methods to optimise the use of materials. This must be done for each of the following stages (see Table 91 on the next page):

- 1.a Preparation and Brief
- 1.b Concept Design
- 1.c Developed Design
- 1.d Technical Design
- 1.e Construction

2 Develop, record, and implement measures to improve material efficiency, consistent with the targets set earlier (see Table 91 on the next page), during:

- 2.a Developed Design
- 2.b Technical Design
- 2.c Construction

3 At project completion, report the targets, strategies, and actual material efficiencies achieved across all stages.

Methodology

M1: Material efficiencies

Examples of how material efficiency can be considered at each work stage are provided in Table 91 below. The table is based on the principles set out in Parts 1 and 2 of the BS 8895 series of standards.[75], [76] As a minimum, the measures listed in the 'evidence' rows must be met to show compliance with the issue.

Table 91: Material efficiency strategy

Work stages and efficiencies	
Preparation and Brief	
Objective	To set requirements that inform decisions throughout the design and construction of the project.
Participants	Client or client's agent with input from the design team if appointed.
Action	Assess the site, the likely project scale, and the client's functional and aesthetic requirements to set material efficiency objectives for the project.
Evidence	Dedicated report that sets out a clear framework to guide material efficiency activities throughout the design and construction of the project. The report should set out aims, objectives, targets, performance indicators, opportunities, constraints and responsibilities to guide material efficiency activities.
Concept Design	
Objective	Develop strategies to implement or action the materials efficiency requirements set under the Preparation and Brief stage.
Participants	Design team including at least: — Architect — Structural Engineer — Building Services Engineer
Action	Hold workshops with the project team to identify design opportunities to reduce or optimise materials use through design, specification, construction techniques etc.
Evidence	Minutes of the workshops held. Documentation demonstrating how the feedback from the workshop has been incorporated in the concept design of the project, for example: outline specification for materials selection, report on approximate predicted reductions in material quantities.
Developed Design and Technical Design	
Objective	Develop design proposals based on learning from the concept design.
Participants	All relevant members of the design team.
Action	Incorporate material efficiency measures and strategies identified in concept design into architectural, structural and building services design as appropriate. Review performance against previous stages and identify deviations.
Evidence	Report on deviations from previous stages and additional actions to be taken. Documentation demonstrating the incorporation of the outcomes from the concept stage and additional actions, for example: design drawings or specifications demonstrating materials efficiency measures undertaken.
Construction	
Objective	Implement material efficiency measures in construction.
Participants	Principal contractor.
Action	Implement material efficiency measures and strategies identified in previous stages in building construction and identify deviations. Identify further efficiencies as appropriate for this stage.
Evidence	Report on deviations from previous stages. Documented evidence of activity to further identify efficiencies at this stage, for example: meeting minutes, training events, waste reduction documentation etc.

Compliance notes

None.

Evidence

Criteria	Interim design stage	Final post-construction stage
All	For design stage actions (criteria 1.a to 1.d and 2.a to 2.b): The evidence required to demonstrate compliance will vary according to the work stage. Examples of how material efficiency could be considered together with the **minimum** evidence requirements to be provided, at each project stage, are set out in Table 91 on the previous page. For construction stage actions (criteria 1.e and 2.c): Relevant section of the building specification or contract clauses or letter of commitment to report material efficiencies at post-construction.	Examples of how material efficiency could be considered together with the **minimum** evidence requirements to be provided at post-construction are set out in Table 91 on the previous page.

Definitions

Material efficiency

The process of undertaking a building project to enable the most efficient use of materials over the life cycle of the building and its components. This includes using fewer materials, reusing existing demolition and strip-out materials and, where appropriate, procuring materials with higher levels of recycled content. It may also include the adoption of alternative means of design or construction that result in lower materials usage and lower wastage levels including off-site manufacture and use of pre-assembled service pods.

Relevant parties

All parties (as relevant to the project stage) involved in the design, specification or construction of the building should be consulted. This includes, but is not limited to, the following:

1. Client or developer
2. Cost consultant
3. Architect
4. Structural or civil engineers
5. Building services engineers – mechanical, electrical
6. Principal contractor
7. Demolition or strip-out contractor
8. Environmental consultant
9. Project management consultant
10. Materials or component manufacturers or suppliers

Additional information

Examples of material efficiency opportunities

Examples of suitable material efficiency design measures can include:

1. Increasing the utilisation factor of structural members
2. Designing to standard material dimensions to reduce off-cuts and waste on site
3. Removing redundant materials from the design
4. Using materials that can be recycled or reused at the end of their service life

5. Making use of recycled or reclaimed materials
6. Designing for deconstruction and material reuse
7. Using pre-fabricated elements where appropriate to reduce material waste
8. Consider using an 'exposed thermal mass' design strategy to reduce finishes
9. Avoiding over-specification of predicted loads
10. Using lightweight structural design strategies
11. Making use of bespoke structural elements where this will reduce overall material use
12. 'Rationalisation' of structural elements
13. Optimising the foundation design for embodied environmental impact.

BS 8895 Designing for material efficiency in building projects

BS 8895 outlines specific material efficiency processes, key tasks, team members and their responsibilities, and outputs specific to each work stage, along with supporting guidance and tools. This serves as a useful tool to assist the design team in developing and implementing material efficiency strategies for their developments.

The standard comprises the following parts:

— Part 1: Code of practice for Strategic Definition and Preparation and Brief
— Part 2: Code of practice for concept and developed design
— Part 3: Code of practice for technical design(77)

Resilience



Summary

This category encourages the assessment and enhancement of asset resilience to the impacts of climate change, natural hazards, and disruptive events throughout the asset's operational lifespan.

Issues in this section promote the implementation of proactive measures that strengthen the building's capacity to anticipate, absorb, recover from, and adapt to both acute shocks and chronic stresses. It recognises measures that safeguard occupants, preserve asset value, support business continuity, and contribute to broader community resilience through the use of nature-based solutions and other interventions, while building in future adaptation capacity to address evolving climate risks and operational challenges.

Assessment issues

Rsl 01 High level climate and natural hazard exposure screening	1 credit
Rsl 02 Climate-responsive natural hazard resilience strategy	3 credits
Rsl 03 Implementing resilience and adaptation measures	5 credits
Rsl 04 Protection against human error and malicious damage	3 credits + 1 exemplary
Rsl 05 Surface water run-off management	2 credits
Rsl 06 Increasing local resilience through the asset	2 credits

Rsl 01 High level climate and natural hazard exposure screening

(all buildings)

Aim

To promote early-stage identification and awareness of natural hazard and climate-change exposure at the asset location through a desk-based screening process supporting more resilient and sustainable project decisions.

Overview

Assessment type	Credits available	Minimum standards	Applicable assessment criteria
Part 1: Fabric and structure	1	None	All
Part 2: Core services	1	None	All
Part 3: Local services	0	None	Not applicable
Part 4: Interior design	0	None	Not applicable

Assessment type specific notes

Ref	Assessment type specific note
-	None

Building type specific notes

Ref	Building type specific note
-	None

Assessment criteria

One credit – Natural hazard screening

1 Carry out a natural hazard and climate change exposure screening at the early project stage that identifies and prioritises relevant hazards (M1), follows the defined scope and application boundaries (M2), and uses appropriate hazard datasets and sources (M3).

Methodology

M1: Natural hazard and climate change exposure screening

1. A document (or part of one) identifies all natural hazards that the asset may be exposed to during its lifetime due to its location.
2. The identification of current and future hazards has been conducted using authoritative publicly available or third-party datasets, incorporating both present-day hazard exposure and future climate projections under at least one scenario (at least RCP8.5 or SSP5-8.5, i.e a high emissions scenario) for all relevant hazards.

3. Future conditions analysis must extend to mid-century (2050s) or the asset design life, whichever is shorter and uses projections to identify how the type, frequency, or intensity of hazards may change.
4. Use of a high emissions scenario (e.g. RCP8.5 / SSP5-8.5) is intended to provide a conservative indication of future hazard conditions. However, as climate scenarios show limited divergence prior to 2050, this approach alone does not fully represent tail-end risks. Where possible, the analysis should therefore also consider the upper range or more extreme expressions of relevant hazards (e.g. higher percentiles, extreme events, or sensitivity assumptions).
5. The hazards are prioritised based on likelihood and intensity, producing a four-tier classification system (No Hazard, Low, Medium, High) with a consistent and documented methodology. Each hazard-asset interaction shall be classified using the following four-tier system:
    a. High: Hazard exposure likely exceeds acceptable thresholds; further detailed analysis required.
    b. Medium: Moderate exposure levels requiring consideration of adaptation measures.
    c. Low: Minimal exposure identified; standard resilience practice likely sufficient.
    d. No Hazard: No exposure identified for planning timeframe.

    Classifications should be based on established thresholds including national regulatory zoning, indices, recognised industry standards, or peer-reviewed scientific criteria (see Additional information). The classification methodology must be clearly documented, consistently applied across all hazards, and appropriate to local conditions.

M2: Scope and application

This screening is qualitative and location-based only; it does not include building vulnerability analysis or return period quantification (addressed in Rsl 02 Climate-responsive natural hazard resilience strategy).

This credit is designed for use at pre-acquisition feasibility or early design stage when basic asset parameters (location, use type, design life) are established. The screening provides strategic risk intelligence rather than detailed vulnerability analysis or adaptation solutions.

M3: Hazard selection and data sources

The following hazards represent a primary threat to the built environment and must be assessed alongside any additional localised hazards. Where any items are excluded on the basis that they are not applicable to the site's geography, this must be clearly documented in the report.

1. Flooding (fluvial, pluvial, and coastal)
2. Heat/cold waves (acute)
3. Wildfires
4. Storms and extreme winds (including hurricanes/typhoons/cyclones)
5. Extreme precipitation (rain, snow/ice, hail)
6. Chronic heat/temperature stress (long-term warming/variability)
7. Drought or water scarcity

For the purposes of BREEAM, seismic (earthquake) risk is assumed to be addressed through existing building codes and regulations and hence not identified in the list above.

Asset locations must be screened against all relevant hazards based on geography, building sector, and planning timeframe. Determine relevance using national/sub-national hazard assessments, climate adaptation plans, or recognised frameworks (IPCC Climate Impact-Drivers, TCFD sectoral guidance, national climate risk assessments, or databases like ThinkHazard, UNDRR Global Assessment Report).

Use publicly or commercially available third-party datasets including national climate projections and hazard maps from meteorological agencies, international databases and tools, regulatory hazard zones, and peer-reviewed scientific datasets.

Compliance notes

Ref	Terms	Description
CN1	Internal capability	Assessment may be completed by internal sustainability, risk management or design teams or BREEAM Advisory Professional (AP) who have received training in or can demonstrate competency in climate risk assessment principles. The identification of existing natural hazard and climate risk conducted as part of a different process may be accepted if it includes identification of hazards at the assessed asset. While specialist climate risk consultants may be engaged, this is not required for credit achievement.
CN2	Methodological rigour	The screening methodology and sources must be sufficiently robust to support strategic decision-making and external audit, with clear documentation of methods.
CN3	Geographic applicability	Credit requirements apply globally with methodology adapted to local hazard profiles, data availability, and regulatory contexts.
CN4	Multiple assets	Screening outputs may be applied across multiple assets with similar risk profiles (location, sector, design parameters) provided the hazard context, data sources and assessment assumptions remain valid; reuse must be explicitly documented and justified.

Evidence

Criteria	Interim design stage	Final post-construction stage
1	A copy of the natural hazard and climate change exposure screening assessment.	No further actions required post-construction. No additional evidence is required other than that listed for the design stage.

Definitions

Climate scenario

Plausible representation of future climate conditions based on assumptions about greenhouse gas emissions, socioeconomic development and policy responses, typically following IPCC framework methodologies.

Hazard exposure

The presence of an asset in a location that could be adversely affected by natural hazard events, independent of vulnerability characteristics.

Natural hazard

Physical climate and weather-related events that have the potential to cause harm, damage or disruption to the built environment. Hazards refer to reasonably anticipated potential events, precipitated by natural activities, that impact the ability of a building, piece of infrastructure, community or the people that rely on that building or infrastructure to continue to maintain functionality at or above the level in place prior to the event. Hazards can be characterised as shocks or stresses.

Shocks: Shocks are events that develop over a short time period and have an immediate, measurable impact on the affected people, buildings, systems, or communities. These can also be described as an acute event.

Stresses: Stresses are events that develop over an extended period of time with impacts that may not be immediately noticeable, but over time impact people, buildings, systems, or communities. These can also be described as a chronic event.

Additional information

Data sources and tools

1. The World Bank Climate Change Knowledge Portal (CCKP): https://climateknowledgeportal.worldbank.org/
2. ThinkHazard!: https://www.thinkhazard.org/en/

3. The UNEP FI Sustainability Risk Tool Dashboard: https://www.unepfi.org/themes/climate-change/the-sustainability-risk-tool-dashboard/
4. The UK's Met Office Climate data portal. Available from: https://climate-themetoffice.hub.arcgis.com/
5. Green Book supplementary guidance: climate change and environmental valuation (https://www.gov.uk/government/publications/green-book-supplementary-guidance-environment)
6. UK's Climate Risk Indicators: https://uk-cri.org/
7. The use and interpretation of 'extreme' and 'worst-case' climate scenarios in the UK: https://www.metoffice.gov.uk/binaries/content/assets/metofficegovuk/pdf/research/spf/high-impact-low-likelihood-hill-scenarios-for-the-uk/use-and-interpretation-of-worst-case-uk-climate-scenarios.pdf
8. CIBSE Weather Data:https://www.cibse.org/policy-insight/news/cibse-launches-new-weather-data-set-to-support-resilient-building-design-in-a-changing-climate/
9. Géorisques (Government of France): https://www.georisques.gouv.fr/
10. Natural Hazards Portal (Government of Germany): https://www.naturgefahrenportal.de/de
11. GIS-ImmoRisk Natural Hazards (Government of Germany): https://gisimmorisknaturgefahren.de/
12. HORA (Government of Austria): https://hora.gv.at/
13. FEMA National Risk Index (NRI) (USA): https://fema.gov
14. FEMA Hazus (USA): https://gis-fema.hub.arcgis.com/ and https://coast.noaa.gov/digitalcoast/tools/hazus-mh.html
15. FEMA Resilience Analysis and Planning Tool (RAPT): https://rapt-fema.hub.arcgis.com/
16. HazardDB (USA): https://hazarddb.com
17. CLIMADA (CLIMate ADAptation): https://climada.ethz.ch/
18. Denmark's Miljøportal: https://www.miljoeportal.dk/en/about-danmarks-miljoeportal/

Rsl 02 Climate-responsive natural hazard resilience strategy

(all buildings)

Aim

To encourage quantified assessment of natural hazard and climate change risks over the asset lifetime, providing risk metrics and recommending resilience and adaptation measures to guide design and investment decisions.

Overview

Assessment type	Credits available	Minimum standards	Applicable assessment criteria
Part 1: Fabric and structure	3	None	All
Part 2: Core services	3	None	All
Part 3: Local services	0	None	Not applicable
Part 4: Interior design	0	None	Not applicable
EU Taxonomy	-	-	All (see M5)

Assessment type specific notes

Ref	Assessment type specific note
-	None

Building type specific notes

Ref	Building type specific note
-	None

Assessment criteria

Prerequisite – Appropriate consultant

1 Appoint an external Appropriate Consultant to prepare the Resilience and Adaptation Strategy for this issue, undertake the required analyses, and evidence compliance with all criteria of this issue.

Up to three credits – Resilience and adaptation strategy

2 Develop a Resilience and Adaptation Strategy (see M1 and M4) and ensure that it:

- 2.a Identifies the highest-priority physical climate and natural hazard risks and expected impacts on the asset over its life cycle.
- 2.b Provides the design team with inputs and design considerations to address these impacts.
- 2.c Outlines potential resilience and adaptation measures to reduce risk from identified hazards.

3 **One credit** for producing a 'Basic resilience and adaptation strategy' that meets or exceeds the requirements of M2.

4 **Three credits**, in place of the one credit above, for producing an 'Advanced resilience and adaptation strategy' that meets or exceeds the requirements of M3.

Methodology

M1: Resilience and adaptation strategy

The Resilience and Adaptation Strategy (see criterion 2) should be developed early enough that it can inform design decisions and should be informed by a structured process reflecting risk management best practice (such as ISO 31000: Risk management) and must address the following steps:

1. Nominate a responsible individual (e.g., client PM, lead designer, or BREEAM AP) to coordinate the strategy and ensure its integration into design decisions. The responsible individual must have authority to integrate outputs into design, coordinate actions, and track decisions. The Strategy must state name, role, organisation, contact, and a brief responsibilities statement.
2. Hazard identification – Review authoritative sources of natural hazard and climate information and local adaptation resources to identify relevant physical hazards.
3. Hazard assessment – Consider the likelihood and potential impact of identified hazards over the asset's expected life cycle.
4. Risk prioritization – Determine which hazards pose the greatest risk to the asset's performance, safety, and continuity.
5. Adaptation planning – Outline practical resilience and adaptation measures to reduce risk, considering feasibility and cost-effectiveness. The measures should address the following categories to support holistic resilience of the asset:
    a. Measures that address the highest-priority acute hazard risks.
    b. Measures that address the highest-priority chronic climate risks.
    c. Measures that maintain operational continuity during disruptive events.
    d. Measures that facilitate operational recovery following disruptive events.
    e. Measures that provide capacity for future adaptation to evolving climate-related physical risks.
6. Measures should give priority to the use of nature-based solutions or rely on blue and green infrastructure to the extent possible.
7. Single integrated measures that address multiple risks simultaneously should be given preference to encourage integrated and efficient use of resources.
8. Early warning services: Identify sources of early warning information that support the continuous monitoring of risks and can trigger preparedness activities.
9. Monitoring and review: Identify metrics and indicators that support the monitoring of the effectiveness of resilience and adaptation measures over the lifetime of the asset. Define how the strategy will be revisited during design development and, where relevant, during operation to ensure measures remain effective and responsive to updated climate and natural hazard risk profiles.

The process should be proportionate to the asset's scale and lifespan and may follow recognized frameworks such as ISO 14090: Adaptation to climate change or equivalent.

M2: Basic resilience strategy

A basic risk assessment must satisfy the requirements in Table 92.

Table 92: Requirements for a basic resilience strategy

Timing	Inform design decisions
Purpose	Inputs for design teams
Timeline	5 years and Expected life of the asset
Hazard	— Qualitative and quantitative assessment of the history of natural hazard impacts at and near the

considerations	asset in the past (minimum) 20 years (meteorological offices, disaster databases, local news, etc.). — Impact of climate change on existing exposure using at least two climate scenario projections (RCP 4.5, or SSP2-4.5 and RCP8.5, or SSP5-8.5) for given timeline. — Using a multi-scenario approach: RCP 4.5 or SSP2-4.5 as the central, policy-aligned scenario as a basis for designs, and RCP8.5 or SSP5-8.5 as a high-end stress test to understand upper-bound climate risk. — Provide return period analysis for 1-in-200-year hazard intensities for probabilistically modelled hazards (e.g., fluvial flooding, coastal flooding, windstorms, seismic events) where possible. For other hazards, provide scenario-based severity estimates.
Vulnerability considerations	— Use archetypal loss functions with known occupancy type and known building characteristics like structural system, construction material, age, height (floors, basements) and scope of refurbishment.
Analysis	— Assessment of impacts on the asset, operation, users and/or property asset (vulnerability). — Average Annual Loss (AAL) for current and projected future climate conditions for different hazards. — Damage ratio for annual maximum loss. — Recommended adaptation measures.
Outputs	— Prioritised list of hazards supported by analysis. — Qualitative and quantitative narrative of possible impacts on the asset, operation, users and/or property asset. — Physical hazard risk metrics suitable for designing adaptation and resilience measures. — Recommended adaptation and resilience measures aligning with requirements of Rsl 03 (see Rsl 02 M1, step 5). — The strategy must be produced in a way that provides appropriate design considerations to the design team (architects and engineers) to address all identified risks. — The strategy must clearly document the methodology, data sources, climate scenarios, baseline year, hazard metrics, and financial metrics used – to support future updates and audits.

M3: Advanced resilience strategy

In addition to the requirements listed in M2, an advanced resilience strategy must satisfy the requirements in Table 93.

That is, in the case of return-period analysis – if the Basic Resilience Strategy requires an analysis of 1 in 200 years, then Advanced requires 1-in-100 year and 1-in-500 year, in addition to 1-in-200 year analysis.

Table 93: Requirements for an advanced resilience strategy

Timing	Inform design decisions
Purpose	Inputs for design teams
Timeline	5, 25, and Expected lifetime of asset
Hazard considerations	In addition to those listed for a basic resilience strategy: — Local topographic, soil, and microclimate characteristics. — Impact of climate change on existing exposure using three or more climate scenarios with full uncertainty quantification across climate scenarios and return periods. — Return period analysis covering minimum 1-in-100 and 1-in-500-year hazard intensities for probabilistically modelled hazards (e.g., fluvial flooding, coastal flooding, windstorms, seismic events). For other hazards, provide scenario-based severity estimates. — Consideration of compound and cascading events.

Vulnerability considerations	In addition to those listed for a basic resilience strategy:
	— Use building characteristics like:
	  — Age of the existing structure
	  — Construction material
	  — Method of construction
	  — Number of floors
	  — Presence of basements
	  — Roof characteristics
	  — Wall characteristics

	— Foundation characteristics — Asset use or occupancy type — Building value — Building contents value. — Use Asset-specific damage functions based on actual construction materials, systems, and building geometry. — Use of known important building features pertaining to each hazard (e.g. finish floor elevation for flood risk) and design information to quantify resisting capacity (e.g. strength of wind-resisting system)
Analysis	In addition to those listed for a basic resilience strategy: — Expected Annual Loss with P5/P95 confidence intervals. — Scenario-based loss estimates for multiple return periods. — Extreme Value Analysis. — Multi-criteria options appraisal of resilience and adaptation measures that integrates the qualitative co-benefits of the measures towards other sustainability and policy. — Analysis losses/value at risk of with or without adaptation. — Order-of-magnitude adaptation intervention packages with cost ranges (± 50%). — Scenario based stress-testing of proposed measures. — Consideration of compound events and cascading failures.
Outputs	In addition to those listed for a basic resilience strategy: — Asset specific bespoke design inputs.

M4: Hazard selection and data sources

The following hazards represent a primary threat to the built environment and must be assessed alongside any additional localised hazards. Where any items are excluded on the basis that they are not applicable to the site's geography, this must be clearly documented in the report.

1. Flooding (fluvial, pluvial, and coastal)
2. Heat/cold waves (acute)
3. Wildfires
4. Storms and extreme winds (including hurricanes/typhoons/cyclones)
5. Extreme precipitation (rain, snow/ice, hail)
6. Chronic heat/temperature stress (long-term warming/variability)
7. Drought or water scarcity

For the purposes of BREEAM, seismic (earthquake) risk is assumed to be addressed through existing building codes and regulations and hence not identified in the list above.

Asset locations must be screened against all relevant hazards based on geography, building sector, and planning timeframe. Determine relevance using national/sub-national hazard assessments, climate adaptation plans, or recognised frameworks (IPCC Climate Impact-Drivers, TCFD sectoral guidance, national climate risk assessments, or databases like ThinkHazard, UNDRR Global Assessment Report).

Use publicly or commercially available third-party datasets including national climate projections and hazard maps from meteorological agencies, international databases and tools, regulatory hazard zones, and peer-reviewed scientific datasets.

M5: EU Taxonomy

For alignment with the EU Taxonomy, the asset location must be screened against all hazards listed in the Reference Natural Hazards Table (Table 94) and any exclusions should be listed with a brief justification.

Table 94: Reference natural hazards

	Temperature	Wind	Water	Solid mass
Chronic impacts	Changing temperature (air, fresh water, marine	Changing wind patterns	Changing precipitation patterns and types, incl. rain, snow, hail and	Coastal erosion

	Temperature	Wind	Water	Solid mass
	water)		ice	
	Heat stress		Precipitation or hydrological variability	Soil degradation
	Temperature variability		Ocean acidification	Soil erosion
	Permafrost thawing		Saline intrusion	Solifluction
			Sea level rise	
			Water stress	
Acute	Heat wave	Cyclone, hurricane, typhoon	Drought	Avalanche
	Cold wave/frost	Storms (including blizzards, dust and sandstorms)	Heavy precipitation (rain, hail, snow/ice)	Landslide
	Wildfire	Tornado	Flood and storm surge, surface water run-off and ground water flood	Subsidence
			Glacier lake outburst	Earthquake
			Tsunamis	Volcanic eruption

Compliance notes

Ref	Terms	Description
CN1	Climate data requirements	Climate projections must utilize peer-reviewed datasets from recognized sources including IPCC Working Group reports, national meteorological services, or validated regional climate models. Local downscaling approaches are acceptable with a documented methodology.
CN2	Communicating uncertainty bounds and analysis limitations	All risk estimates must include appropriate uncertainty bounds, sensitivity analysis, and model limitation disclosures. Assessment accuracy levels must be clearly communicated relative to intended decision-making applications.

Evidence

Criteria	Interim design stage	Final post-construction stage
1	Consultant appointment documentation and qualification summary.	No further actions required post-construction. No additional evidence is required other than that listed for the design stage.
2–4	Copy of compliant resilience and adaptation strategy report, including implementation measures and performance targets.	No further actions required post-construction. No additional evidence is required other than that listed for the design stage.

Definitions

Appropriate consultant

The consultant should be external to the project delivery team and demonstrate:

- Relevant professional designation and/or qualifications in engineering, architecture or science.
- A minimum of 3 years of appropriate experience in the building performance, natural hazard mitigation, or building resilience fields.
- Experience commensurate with the target asset type and scope (size, complexity, etc.).

— For complex projects this may be a firm or a team of individuals that collectively possess the full range of required expertise, including local regulatory knowledge.

Compound risks and cascading impacts

Compound risks are risks that arise from the interaction of different hazards, which may be characterised by single extreme events or multiple coincident or sequential events that interact with exposed systems or sectors. For example, wildfires during droughts / low water availability or storms causing flooding and power blackouts.

Cascading impacts from extreme weather/climate events occur when an extreme hazard generates a sequence of secondary events in natural and human systems that result in physical, natural, social or economic disruption, whereby the resulting impact is significantly larger than the initial impact. Cascading impacts are complex and multi-dimensional, and are associated more with the magnitude of vulnerability than with that of the hazard (see IPCC, 2022: Annex II: Glossary, modified from Pescaroli & Alexander, 2015). For example, storms causing disruption of power supply and telecommunications or extreme precipitation causing floods and landslides.

Return period

A return period, also known as a recurrence interval or repeat interval, is an average time or an estimated average time between events such as earthquakes, floods, landslides, or river discharge flows to occur. The reciprocal value of return period is called the frequency of occurrence. It is a statistical measurement typically based on historic data over an extended period and is used usually for risk analysis. Examples include deciding whether a project should be allowed to go forward in a zone of a certain risk or designing structures to withstand events with a certain return period. The following analysis assumes that the probability of the event occurring does not vary over time and is independent of past events.

Stress testing

Stress testing is a process for assessing the ability of a system to maintain a certain level of functionality under unfavourable conditions and understanding the consequences if this functionality is not maintained (CIWEM).

Stress testing may be understood as being a tool or structured approach to simulate the performance of an asset or system under extreme but plausible conditions to identify vulnerabilities. This can support in understanding the costs, benefits and wider implications of addressing vulnerabilities, and support decisions on acceptable levels of resilience. It can also be used to assess the ability of a system to meet agreed resilience goals and standards

Additional information

Resources

1. 'Developing a strategy for climate resilient buildings', WGBC 2025, https://worldgbc.org/wp-content/uploads/2025/08/WorldGBC-Resilience-Strategy-paper.pdf
2. 'How to perform a robust climate risk and vulnerability assessment for EU taxonomy reporting?' German Environment Agency, 19 November 2022 https://www.umweltbundesamt.de/sites/default/files/medien/2666/dokumente/climate-risk-assessments-for-taxonomy-reporting_final_bf_221122.pdf
3. Guidance Note on Climate Change Risk Assessment https://equator-principles.com/app/uploads/Guidance-CCRA_May-2023.pdf
4. Historic England's technical guidance on looking after historic buildings and sites, including climate change adaptation, retrofit and energy efficiency advice; plus briefing on recording, and information and project management. https://historicengland.org.uk/advice/technical-advice/
5. Code of practice for property flood resilience (C790): https://www.ciria.org/CIRIA/Resources/Free_publications/CoP_for_PFR_resource.aspx
6. Extreme value analysis: https://www.metoffice.gov.uk/services/research-consulting/weather-climate-consultancy/extreme-value-analysis
7. Multi-criteria analysis:
    a. UNFCCC https://www4.unfccc.int/sites/NAPC/Country%20Documents/General/Multi-Criteria%20Analysis_CLEARED.pdf

   b. WeAdapt https://weadapt.org/knowledge-base/adaptation-decision-making/mediation-multi-criteria-analysis/

   c. UNDP https://www.adaptation-undp.org/sites/default/files/uploaded-images/day_2_session_6_multi_criteria_analysis_final.pdf

8. Scenario Planning: https://www.fisheries.noaa.gov/national/climate/scenario-planning-tool-climate-informed-decision-making

9. Adaptation co-benefits, World Bank https://thedocs.worldbank.org/en/doc/6f438059fcd67d697592f0dd3e2ed151-0090012021/original/1-Reference-Guide-on-Adaptation-Co-Benefits.pdf

10. A Guide to Assessing Green Infrastructure Costs and Benefits for Flood Reduction (NOAA) https://coast.noaa.gov/data/digitalcoast/pdf/gi-cost-benefit.pdf

11. UKGBC A Framework for Measuring and Reporting of Climate-related Physical Risks to Built Assets, 2022 https://ukgbc.org/wp-content/uploads/2022/02/UKGBC-Measuring-and-Reporting-Physical-risk-Report.pdf

12. Stress testing:

   a. Climate Change Stress Testing Guidance, CIWEM, July 2023 https://www.ciwem.org/assets/pdf/Policy/Reports/202307%20Guidance%20-%20Climate%20Change%20Stress%20Testing.pdf

   b. UNEP FI's Comprehensive Good Practice Guide to Climate Stress Testing https://www.unepfi.org/wordpress/wp-content/uploads/2021/12/Good-Practice-Guide-to-Climate-Stress-Testing.pdf

   c. OFGEM, UK, 2025 https://www.ofgem.gov.uk/sites/default/files/2025-10/ED3%20SSMC%20Climate%20Resilience%20Stress%20Testing%20Methodological%20Framework%20Annex%20FINAL_clean.pdf

Rsl 03 Implementing resilience and adaptation measures

(all buildings)

Aim

To encourage the documentation and implementation of adaptation and resilience measures based on outputs of natural hazard and physical climate risks and mitigation measures identified in Rsl 02.

Overview

Assessment type	Credits available	Minimum standards	Applicable assessment criteria
Part 1: Fabric and structure	5	None	All
Part 2: Core services	5	None	All
Part 3: Local services	0	None	Not applicable
Part 4: Interior design	0	None	Not applicable
EU Taxonomy	-	-	All

Assessment type specific notes

Ref	Assessment type specific note
-	None

Building type specific notes

Ref	Building type specific note
-	None

Issue specific notes

Ref	Issue specific note
-	None

Assessment criteria

Prerequisite

1 Achieve at least one credit under Rsl 02 Climate-responsive natural hazard resilience strategy

One credit – Acute hazard resilience measures

2 Implement measures that address the highest-priority acute hazard risks identified in the resilience and adaptation strategy in Rsl 02.

OR

3 Confirm that the resilience and adaptation strategy in Rsl 02 identifies no acute hazard risks to the asset during its lifetime and hence doesn't require any resilience measures to reduce risk from acute hazards.

One credit – Chronic climate adaptation measures

4 Implement measures that address the highest-priority chronic climate risks identified in the resilience and adaptation strategy in Rsl 02.

One credit – Operational continuity (backup) measures

5 Implement measures that maintain operational continuity during disruptive events identified in the resilience and adaptation strategy in Rsl 02.

OR

6 Confirm that the resilience and adaptation strategy in Rsl 02 identifies no acute hazard risks to the asset during its lifetime and hence doesn't require operational continuity or backup related measures.

One credit – Recovery measures

7 Implement measures that facilitate operational recovery following disruptive events identified in the resilience and adaptation strategy in Rsl 02.

OR

8 Confirm that the resilience and adaptation strategy in Rsl 02 identifies no acute hazard risks to the asset during its lifetime and hence doesn't require recovery related measures.

One credit – Future adaptation capacity

9 Implement measures that provide capacity for future adaptation to evolving climate-related physical risks identified in the resilience and adaptation strategy in Rsl 02.

Methodology

M1: Alignment with Rsl 02

1. Refer to the resilience and adaptation strategy developed in Rsl 02 and identify the appropriate resilience and adaptation measures for each applicable credit (acute, chronic, operational, recovery, or future adaptation).
2. Incorporate the recommended resilience and adaptation measures into the design and ensure they are fully implemented before the asset is occupied or brought into use.
3. Ensure the implemented measures aim to reduce the impacts of at least the highest-priority physical natural hazard and climate risks relevant to the asset.
4. Where a single integrated measure addresses multiple risk categories simultaneously, allow it to contribute towards achieving multiple credits within this issue, supporting integrated and efficient solutions.
5. Ensure that the implemented measures:
    a. Do not adversely affect the adaptation efforts or the level of resilience to physical climate risks of:
        i. Other people
        ii. Nature
        iii. Cultural heritage
        iv. Other assets
        v. Other economic activities
    b. Are consistent with relevant local, sectoral, regional, or national adaptation strategies and plans.
    c. Consider the use of nature-based solutions or rely on blue or green infrastructure to the extent possible.

Compliance notes

None.

Evidence

Criteria	Interim design stage	Final post-construction stage
2–9	Written report from the design team detailing proposed mitigation measures based on the recommendations of the Rsl 02 report. Documentary evidence such as relevant sections of the building specification, contract clauses or design drawings which show the required resilience and adaptation measures have been specified.	Final construction drawings or equivalent and/or assessor site inspection report and photographic evidence to show that the required resilience and adaptation measures have been implemented within the final design. Any deviations from the design stage proposals must be justified in writing by an appropriate member of the design team, confirming how the alternative measures align with the Rsl 02 resilience and adaptation strategy.

Definitions

Acute hazard resilience measures

Physical and/or design interventions that reduce vulnerability to sudden-onset hazard events.

Adaptation

Climate change adaptation is the process of modifying the built environment – buildings, infrastructure, and urban spaces – to address, cope with, and possibly regenerate and thrive under the impacts of climate change. The goal of adaptation is to make the built environment more durable, functional, and safe under changing climate conditions.

Chronic climate adaptation measures

Physical and/or design interventions that address long-term climate change impacts and gradual environmental changes.

Future adaptation capacity

Design flexibility, infrastructure provision or system specifications that enable future modification to address evolving risks.

Green infrastructure

The term 'green infrastructure' means the range of measures that use plant or soil systems, permeable pavement or other permeable surfaces or substrates, stormwater harvest and reuse, or landscaping to store, infiltrate, or evapotranspirate stormwater and reduce flows to sewer systems or to surface waters. https://www.epa.gov/green-infrastructure/about-green-infrastructure

Nature-based solutions (NbS)

The International Union for Conserving Nature (IUCN) defines NbS as: "actions to protect, sustainably manage and restore natural or modified ecosystems that address societal challenges effectively and adaptively, simultaneously providing human wellbeing and biodiversity benefits".

Operational continuity measures

Backup systems, redundancies or alternative arrangements that maintain essential building functions during disruption.

Physical recovery measures

Design features or systems that facilitate rapid restoration of building integrity and functionality following damage.

Resilience

The ability of the built environment to resist, absorb, and recover from climate-related disruptions.

A resilient structure is one that can endure stress from an event like a flood or storm and continue functioning or quickly return to normal operation afterward. This involves not only withstanding the initial impact but also having systems in place to deal with the aftermath.

Additional information

Acute hazard resilience measures

Examples include but are not limited to:

- Raising ground level of building and access routes to 600 mm above design flood level
- Permanent or temporary flood barriers
- Waterproofing systems at basement or ground floor level
- Nature-based flood prevention measures (retention ponds, bioswales etc)
- Non-return valves on drainage pipes
- Enhanced entrance canopies or windbreak features for storm protection
- Reinforced or impact-resistant windows and doors for extreme weather events
- Safe room designation with communication equipment for severe weather
- Elevated mechanical and electrical systems above historical flood levels
- Secondary drainage systems to prevent water ingress during intense rainfall

Chronic climate adaptation measures

Examples of appropriate measures could include but are not limited to:

- External shading systems (awnings, shutters, green screens) for solar control
- Improved natural ventilation through window placement or ventilation grilles
- Heat-reflective or cool roof materials to reduce urban heat island effect
- Moisture management systems to address changing humidity patterns
- Climate-appropriate planting and irrigation for changing precipitation
- Thermal mass enhancement through appropriate material selection
- Adaptive HVAC controls responding to seasonal temperature variations

Operational continuity measures

Examples of appropriate measures could include but are not limited to:

- Backup water storage tanks for domestic or fire protection use
- Secondary internet and telecommunications connectivity
- Emergency generator connections for essential systems (lifts, lighting, security)
- Alternative pedestrian and vehicle access routes during disruption
- Portable or temporary power supply connection points
- Emergency supply storage areas for maintenance materials
- Remote monitoring systems for building performance during events

Physical recovery measures

Examples of appropriate measures could include but are not limited to:

- Resilient flooring materials designed for easy cleaning/repair/replacement after flooding
- Accessible utility isolation points and clearly marked emergency shut-offs
- Demountable internal partitions for rapid reconfiguration after damage
- Prefabricated repair kits or replacement components stored on-site
- Modular building services allowing sectional isolation and repair
- Heritage-appropriate repair materials pre-sourced and stored
- Clear building recovery plans with supplier and contractor contacts

Future adaptation capacity

Examples of appropriate measures could include but are not limited to:

- Structural capacity for future solar panels, green roofs, or additional equipment
- Conduit routes and plant room space for future renewable energy systems
- Flexible floor plates and removable partitions enabling layout changes
- Accessible roof areas designed for future adaptation installations
- Standard connection points for future electric vehicle charging infrastructure
- Heritage-sensitive fixing points for future climate adaptation equipment

Rsl 04 Protection against human error and malicious damage

(all buildings)

Aim

To encourage the planning, design, and implementation and ongoing management of measures that enhance the safety and security of the building, ensuring its continued safe use supported by a continuous, traceable record of fire-safety information from design through operation and providing an appropriate level of security to protect the building and site against human error and malicious acts.

Overview

Assessment type	Credits available	Minimum standards	Applicable assessment criteria
Part 1: Fabric and structure	3 + 1 exemplary	None	All
Part 2: Core services	2 + 1 exemplary	None	3–8 (see ref 1.1)
Part 3: Local services	2 + 1 exemplary	None	3–8 (see ref 1.1)
Part 4: Interior design	3 + 1 exemplary	None	All except 1.c and 2

Assessment type specific notes

Ref	Assessment type specific note
1.0	**Speculative project** Where the speculative nature of a project prevents a full Security Needs Assessment (SNA), the credit may still be awarded, provided the Suitably Qualified Security Specialist (SQSS) addresses all feasible elements based on the information available at the time of assessment. Any assumptions made regarding future occupiers and their potential influence on security must be clearly documented within the SNA report.
1.1	**Part 2 or Part 3 only assessments** As actions in Parts 2 and 3 cannot meaningfully protect vulnerable parts of the building from damage, criteria 1–2 are filtered out.

Building type specific notes

Ref	Building type specific note
2.0	**Prison buildings** In the case of an assessment of a prison building or development, the security criteria apply only to publicly accessible buildings and car parking areas outside of the secure perimeter zone (but still on the wider prison site). This could include visitor reception or waiting buildings, facilities or estates offices, storage buildings and visitor or staff parking. Security relating to secure prison buildings and their related site layout falls outside the scope of BREEAM.

Assessment criteria

One credit – Protecting vulnerable parts of the building from damage

1 Identify vulnerable parts of the building and incorporate physical safeguards and protection measures into the building's design and construction to protect critical building elements and the building's fabric from accidental or malicious damage

(see M1). Ensure these measures provide protection against:

1.a Negative impacts caused by high user numbers in relevant areas of the building (e.g. corridors, lifts, stairs, doors etc.).

1.b Damage from any vehicle or trolley movements within 1 m of the internal building fabric in storage, delivery, corridor and kitchen areas.

1.c External building fabric damage from vehicles by installing protection where parking or manoeuvring areas are within 1 m of the building façade and where delivery areas or routes are within 2 m of the building façade.

1.d Potential malicious damage to building materials and finishes, in public and common areas where appropriate.

2 Provide for safe access to the roof and façade for cost-effective cleaning, replacement and repair in the building's design.

One credit – Design for fire safety

3 Appoint a Fire Engineer no later than Concept Design (equivalent to RIBA Stage 2).

4 The Fire Engineer must provide a written statement confirming their involvement in the design and implementation of fire safety measures in the asset (see M2.1).

One credit – Security of site and building

5 Appoint a Suitably Qualified Security Specialist (SQSS) to conduct an evidence-based Security Needs Assessment (SNA) (see M3.1) during or prior to Concept Design. The SNA must identify site and surrounding attributes that will influence the development's security strategy.

6 Task the SQSS with developing a set of security controls and recommendations for incorporation into the project proposals (see M3.3). Verify that these measures are aligned with the specific threats to the assets identified in the preceding SNA.

7 Incorporate the controls and recommendations into the design proposals and implement them in the as-built development. Justify any deviation from those controls and recommendations and obtain agreement from the SQSS.

> Note: Alternative route to compliance for criteria 5–7.
>
> Where a project adopts a compliant risk-based security rating scheme (as defined in criterion 8), the requirements of criteria 5 to 7 are deemed met.

One exemplary credit – Security rating scheme

8 Use a compliant risk-based security rating scheme to assess and verify the development's security performance (see M4).

Methodology

M1: Protection measures

M1.1: Examples of suitable protection measures

Suitable protection measures to vulnerable parts of the building can include:

1. Bollards or barriers, or raised kerbs to delivery and vehicle drop-off areas.
2. Robust external wall construction, up to 2 m high.
3. Protection rails to walls of corridors.
4. Kick plates or impact protection (from trolleys etc.) on doors.
5. Hard-wearing and easily washable floor finishes in heavily used circulation areas (i.e. main entrance, corridors, public areas etc.).
6. Designing out the risk without the need for additional materials specification to protect vulnerable areas.

M1.2: Examples of suitable physical safeguards

Suitable physical safeguards can include:

1. Bollards
2. Reinforced casings
3. Tamper-proof fixtures

M1.3: 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 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.

M2: Design for fire safety

M2.1: Fire Engineer's statement

The Fire Engineer is responsible for the technical fire safety advice, recommendations, confirmations and professional statements required by this issue. The BREEAM assessor verifies the presence of the required appointment, competency evidence and Fire Engineer statement. The assessor is not required to determine the technical adequacy of fire safety decisions.

The appointment should be made by, or agreed with, the project's Client or Lead Designer to ensure their independence and appropriate integration into the project team. Early appointment supports timely input into the fire safety strategy and design development, helping to improve fire safety outcomes.

The fire safety engineer must provide a written statement confirming that:

1. They were appointed no later than concept design stage (equivalent to RIBA Stage 2).
2. They provided input on all matters relating to achieving compliance with applicable fire safety requirements.
3. All fire safety recommendations made by the fire safety engineer have been incorporated into the design.
4. Where relevant, deviations from the fire safety engineer's recommendations have been reviewed and accepted by the fire safety engineer.
5. Where engagement with relevant regulatory authorities was required, matters raised by those authorities have been subject to iterative review and resolution.
6. Where written regulatory confirmation is available, no outstanding fire safety design queries remain.
7. The project team assisted the fire safety engineer in verifying that fire safety measures have been implemented as designed.
8. Appropriate fire safety information has been handed over to the building owner, or the person or organisation responsible for operation and fire safety management of the building.

M3: Security of site and building

M3.1: Security needs assessment (SNA)

To demonstrate compliance with the Security of Site and Building credit, the project site-specific Security Needs Assessment (SNA) must be undertaken in line with relevant national regulations or equivalent international standards (see CN2) and include:

1. A visual audit of the site and surroundings, identifying environmental cues and features that may influence the security approach.

   a. This audit is expected to be conducted in person, on-site.
   b. Where a physical site visit is not feasible, or unlikely to add meaningful insight, a desktop review using up-to-date site information, plans, and drawings may be acceptable.
   c. The SQSS must confirm that the chosen method is adequate to inform the SNA. The approach must be proportionate and justified in relation to the site's scale, complexity, location, and context.
2. Stakeholder consultation to understand local crime patterns, security concerns, and disorder risks relevant to the development.
3. Identification of key risks, including:
   a. Risks associated with the proposed or potential use(s) of the buildings.
   b. Risks specific to the building's intended or likely user groups.
   c. Potential negative impacts of the development on the surrounding community.

The outcome of the SNA must directly inform the development of security controls and recommendations, which must:

— Be clearly linked to the threats and assets identified in the assessment.

— Be incorporated into the design proposals.

— Be implemented in the as-built development.

Any deviation from the recommended security measures must be justified and agreed with the SQSS, with supporting evidence retained.

M3.2: Timing of consultation

Where an SQSS was consulted after Concept Design, this credit may still be achievable. Provided all other compliance requirements are met, the credit can still be awarded where the SQSS confirms that the implementation of security measures has not been restricted or impaired or are not possible as a result of their later involvement (i.e. everything that would or could have been recommended can still be implemented).

M3.3: Scope of security controls and recommendations

The scope of recommended security controls may include:

1. **Design and layout** – e.g. crime prevention through environmental design.
2. **Physical security** – e.g. tested and certified security products.
3. **Technological security** – e.g. tested and certified alarms, automatic access control systems, and CCTV. Fire and intruder alarm systems should be certified to a recognised national or international standard and, where relevant, linked to 24-hour monitoring facilities. Such facilities should have appropriate staffing and emergency response procedures in place to ensure that monitoring functions are maintained during incidents.

M4: Security rating scheme

To be recognized as a compliant risk-based security rating scheme for the purposes of the exemplary credit, the scheme must provide a structured and evidence-based method for grading security performance against a defined standard at key project stages. The following programs are currently recognised as a compliant risk-based security rating scheme:

— Proctor

— SABRE

Assessors wishing to use a specific scheme must submit it to BRE Global for review via the Technical Query process. Acceptance will be based on the scheme demonstrating:

— **Third-party verification**: Assessment and verification are conducted by an independent body external to the project design and construction team.

— **Structured risk-based assessment**: The methodology requires a site-specific assessment of threats and assets (e.g., following ISO 22341 CPTED principles).

— **Defined performance standards**: The scheme uses a grading or rating system to reward industry best practices and proportionate security responses.

— **Relevance**: The scheme is applicable to the specific development typology and life cycle stage (e.g., Refurbishment and Fit Out).

M4.1: Order of certification

Certification or formal verification from the compliant security rating scheme must be completed and valid before the final BREEAM certification is issued.

M4.2: Evidence output

The evidence must demonstrate that the risk-based security scheme requirements have been validated. This typically includes:

— **Interim (design stage)**: A design-stage certificate or a letter of conformity from the scheme operator.

— **Final (post-construction)**: An as-built certificate or final verification report confirming the implemented measures meet the scheme's requirements.

M4.3: Timing of assessment

Early engagement with the security rating scheme is recommended to ensure security is integrated into the design. If the scheme is used as an **alternative route** to satisfy criteria 5–7, the process must commence during Concept Design or earlier.

Compliance notes

Ref	Terms	Description
Protecting vulnerable parts of the building from damage		
CN1	Elements outside of the scope of the assessed parts	All assessment criteria relevant to the building type and function apply and must be accounted for in the assessment of this issue. Where vulnerable elements identified are internal and do not form a part of the developer's scope of works i.e. compliance is subject to the tenants' or future occupiers fit-out specification: These areas can be excluded from assessment.
Security of site and building		
CN2	Security needs assessment: international standards	Compliance can be demonstrated by undertaking the Security Needs Assessment (SNA) in line with recognised standards and guidance, such as ISO 22341: Crime Prevention through Environmental Design (CPTED), ISO 31000 Risk Management, EN standards for security systems and products, or recognised UK frameworks such as Secured by Design and the RIBA Security Overlay. The chosen approach must be proportionate, justified, and carried out by a Suitably Qualified Security Specialist (SQSS). Where other national or international standards are applied, the SQSS must justify their suitability.
CN3	Security needs assessment (SNA) – Formal consultation with relevant stakeholders	If a relevant stakeholder does not respond when consulted, the SQSS must provide evidence of reasonable attempts to obtain feedback from relevant stakeholders. If a stakeholder doesn't respond, the SQSS should consider alternative sources of information. For example, check out crime data and include a summary or analysis in their Security Needs Assessment.
General		
CN4	Project part of a larger building	For projects within a larger building where access controls and security systems are already in place, compliance can be demonstrated by reviewing the suitability of the existing provisions and implementing any necessary adaptations. This review must be carried out by a SQSS for security measures.
CN5	Independent verification – SQSS	If the author of a Security Needs Assessment (SNA) does not meet the competency requirements as described in the definitions, compliance can still be achieved where the report is independently reviewed and verified by a qualified SQSS, who confirms in writing that it is accurate, appropriate, and in line with industry best practice.
CN6	Change of SQSS and recommendations	If the designated SQSS changes during the assessment, the original assessors' recommendations may be modified, provided the new assessor can justify the changes and confirm that they remain appropriate for the identified risks.

Evidence

Criteria	Interim design stage	Final post-construction stage
Protecting vulnerable parts of the building from damage		
1	Design drawings illustrating vulnerable areas or parts of the building. Design drawings or specification confirming the durability of the measures specified.	Assessor's site inspection, and photographic evidence confirming compliance. OR Final construction drawings or equivalent.
2	Roof and façade access strategy.	Roof and façade access strategy, updated as required.
Design for fire safety		
3–4	Letter of appointment for the nominated Fire Engineer. Evidence that the nominated Fire Engineer meets the definition of Fire Engineer. Evidence that the Fire Engineer was appointed no later than concept design stage (equivalent to RIBA Stage 2).	Fire Engineer written statement confirming their involvement in the design and implementation of fire safety measures in the asset (see M2.1).
Security of site and building		
5–6	Copy of a compliant security needs assessment and recommendations from a SQSS. Evidence to demonstrate the SQSS meets the competency requirements specified for this role.	No further actions required post-construction, no additional evidence is required other than that listed for the design stage.
7	Design drawings, relevant section of the building specification, contract clauses or letter of commitment to confirm the recommendations from the SQSS will be implemented within the final design.	Final construction drawings or equivalent to confirm the recommended measures have been implemented. Assessor site inspection report and photographic evidence. AND/ OR SQSS inspection report and photographic evidence. Where recommendations are not followed, justification and agreement from the SQSS must be provided.
Security rating scheme		
8	Copy of the security rating scheme certificate from the design stage.	Copy of the security rating scheme certificate (or equivalent) from the post-construction stage.

Definitions

Fire Engineer

A nominated fire engineer meeting the applicable requirements below.

In the UK

A MIFireE or FIFireE Fire Engineer (i.e. a Member or Fellow of the Institution of Fire Engineers), from a fire engineering practice with access to other fire engineers of equivalent standing, to ensure sufficient depth of support where required.

In the US

A SFPE Professional Member (PMSFPE) Fire Engineer, from a fire engineering practice with access to other fire engineers of equivalent standing, to ensure sufficient depth of support where required.

In the EU and other nations
A MIFireE or FIFireE Engineer, from either the UK or the Netherlands (where membership is established) OR a SFPE Professional Member (PMSFPE) Fire Engineer from USA, to attest that the nominated Fire Engineer:

1. has a Bachelor's or Higher degree qualification in Fire Engineering, and
2. is employed at a fire engineering practice with access to other fire engineers of equivalent standing.

Human error and malicious acts

Unintentional mistakes or unsafe behaviours (human error) and deliberate actions intended to cause harm, disruption, or damage (malicious acts, including arson).

Malicious damage

For BREEAM purposes this is damage occurring due to intentional or irresponsible actions by users of the building or the public.

BREEAM has not set specific examples, but the Lead Designer should use their professional judgement to define vulnerable areas that need to be considered for criterion 1.d.

Roof and façade access strategy

A roof and façade access strategy sets out how all roof areas and external façades of the building can be safely accessed for maintenance, inspection and repair activities during its operational life.

Security Needs Assessment (SNA)

A systematic, evidence-based review of site and contextual security risks, including environmental cues, crime data, stakeholder concerns, and potential threats to assets and users. The SNA informs the development of proportionate security measures.

Suitably Qualified Security Specialist (SQSS)

To demonstrate compliance, the project must appoint a Suitably Qualified Security Specialist (SQSS) who meets the following criteria:

1. Experience: A minimum of three years' experience within the last five years in a relevant security profession. This experience must demonstrate a practical understanding of security factors related to the built environment, appropriate to the project's type and scale.
2. Qualification: Holds a degree or a recognized equivalent professional qualification in a security-related discipline.
3. Professional Credentials: Maintains full membership in a relevant professional body, institute, or certification scheme that requires adherence to a formal code of conduct.

The SQSS must demonstrate that their specific expertise and experience are appropriate for the project's security risk level and complexity.

Additional information

References

1. S34 Intruder alarm systems: Ten-step guide for purchasers
2. The NPSA Security Overlay to the RIBA Plan of Work helps designers and developers embed security by aligning protective security tasks with each stage of the RIBA Plan of Work. It encourages early consideration of security risks and promotes collaboration with qualified security professionals during design development. By mapping proportionate, risk-based security activities to key project milestones, the overlay ensures that protective measures are integrated seamlessly into the design, rather than added as reactive features later. This approach supports safer, more resilient developments from the outset and contains signposting to other relevant design guidance.

   You can find the overlay on the NPSA website: www.npsa.gov.uk/security-best-practices/build-it-secure

Recognised security rating schemes

Proctor

Proctor is a structured security rating scheme for buildings and assets (proctorassessment.co.uk). The scheme provides:

- Independent validation of the security risk management process.
- A three-tier rating system (Certified, Commended, Distinguished) based on mandatory performance criteria.
- Continuous specialist oversight throughout the project lifecycle, supporting exemplary security performance.

SABRE

SABRE is a security assessment and certification scheme for buildings and built infrastructure assets, operated by the Association of Security Consultants (ascuk.org/sabre/). The scheme provides:

- An independently assessed security risk management rating for a facility.
- A star-based rating system framework to evaluate security performance against credible threats.
- Quantifiable risk reduction, improved security investment decisions, and value for money.

For all enquiries regarding Proctor or SABRE assessments, or to request technical documentation, please contact the respective scheme administrator directly through their websites provided above.

Rsl 05 Surface water run-off management

(all buildings)

Aim

To avoid, reduce and delay the discharge of rainfall to public sewers and watercourses by incorporating improvements to surface water management as part of refurbishment works, thereby minimising the risk and impact of localised flooding on and around the site.

Overview

Assessment type	Credits available	Minimum standards	Applicable assessment criteria
Part 1: Fabric and structure	2	None	All (see ref 3.0)
Part 2: Core services	2	None	All (see ref 3.0)
Part 3: Local services	2	None	All (see ref 3.0)
Part 4: Interior design	2	None	All (see ref 3.0)

Assessment type specific notes

Ref	Assessment type specific note
-	None

Building type specific notes

Ref	Building type specific note
-	None

Issue specific notes

Ref	Issue specific note
3.0	This issue is applicable only where the refurbishment project includes changes that may affect the site's surface water run-off or drainage characteristics. This includes (but is not limited to): changes to external impermeable/permeable areas; levels or gradients affecting overland flow; roof drainage arrangements or connections; drainage pipework/outfalls; attenuation or infiltration features; or introduction/removal of SuDS components. Where none of these changes occur, this issue is not applicable.

Assessment criteria

Up to two credits – Managing surface water run-off

Prerequisites

1 Appoint an appropriate consultant to carry out and demonstrate the development's compliance with all surface water run-off criteria.

2 Design site-specific surface water run-off solutions that account for the site context and surrounding natural or man-made environment. Follow the priority levels set out in M1.1 and provide justification from the appropriate consultant where the surface water is permitted to discharge off site.

One credit – Surface water run-off – Rate

3 Specify drainage design measures that ensure that the peak rate of surface water run-off from the site to natural or municipal watercourses shows a 30% improvement over the pre-project baseline (see M2). This should comply at the 1-year and 100-year return period events.

4 Include an allowance or adjustment for the changes in precipitation levels due to climate change, applying it in accordance with current best practice planning guidance.

5 Ensure that relevant maintenance agreements are in place for the ownership, long-term operation and maintenance of all specified sustainable urban drainage systems.

One credit – Surface water run-off – Volume

6 Ensure the surface water drainage system is designed so that no flooding occurs to assessed buildings (including basements), utility plant, or safe access/egress routes during rainfall events up to a 1-in-100 year return period event. In addition, identify exceedance (e.g., blockage of inlets or pipework) flow routes and demonstrate that flooding does not enter assessed buildings (including basements) in a local drainage failure scenario (in accordance with M3.2). AND

7 Implement drainage measures that EITHER:

7.a Limit post-project run-off volume to the pre-project run-off volume for the design event (see M3.1 point 1), OR

7.b Where criterion 7.a is not technically viable and this is supported by justification from an appropriate consultant, reduce the post-project peak run-off rate to the defined limiting discharge (see M3.1 point 2).

8 Include an allowance or adjustment for the changes in precipitation levels due to climate change, within all calculations, applying it in accordance with current best practice planning guidance.

9 Ensure that relevant maintenance agreements are in place for the ownership, long-term operation and maintenance of all specified sustainable drainage systems.

Methodology

M1: Surface water run-off design solutions

M1.1: Priority levels

For criterion 2, when specifying and designing surface water run-off management, the appropriate consultant must follow the priority levels listed below (noting that Level 1 has the highest priority). Justification must be provided for each level which does not contribute to managing surface water run-off. This has been set so the most appropriate water management solutions are used, prioritising water use in the development and infiltration over discharge. This is so that the volume of water that leaves the site is limited as far as practicable. In order to use a lower priority final destination, evidence must be provided that it is not possible to further utilise the higher priority destinations. The evidence provided must be part of a formal consultation by an approving body.

— Priority Level 1: Water is collected for non-potable use (e.g. rainwater reuse)

— Priority Level 2: Water is infiltrated into the ground

— Priority Level 3: Water is discharged to an above-ground surface water body

— Priority Level 4: Water is discharged to the drainage system

— Priority Level 5: Water is discharged to a combined sewer

M1.2: Sites with multiple buildings

1. Where the assessed building is on a site with multiple buildings, calculations must include all areas that contribute flow to any drainage element or discharge point that is modified by the project (e.g., new/altered SuDS features, pipework, outfalls, attenuation). In these cases, the assessment must take into account the drainage from the contributing

catchment to the modified system, without proportioning flows between buildings..

2. Where the shared drainage system and discharge points are not modified, calculations may be limited to the external areas within the scope of the assessment, treating the existing receiving system as a fixed constraint.

M2: Surface water run-off – Rate

M2.1: Calculating peak rate of run-off

Calculations must be provided by the appropriate consultant to demonstrate that they have sized the drainage facilities appropriately.

As well as country specific standards identified in the Approved Standards List, further guidance on calculating peak rate run-off for different sites and situations include:

UK

- The SuDS Manual, C753 (CIRIA, 2015)
- National standards for sustainable drainage systems (SuDS) (DEFRA, 2025)
- Preliminary rainfall run-off management for developments
- National planning policy guidance or statement for the specific country
- Institute of Hydrology (IH) Report 124, Flood estimation for small catchments (Marshall and Bayliss, 1994)
- Flood Estimation Handbook (Centre for Ecology and Hydrology, 1999)

In the UK, calculations for run-off rates must be in accordance with IH Report No. 124 Flood estimation for small catchments (Marshall and Bayliss, 1994) and the Pro-rate (Pro-rata) method on the size of catchment detailed in Section 24.4 in The SuDS Manual, CIRIA C753.

Europe

- EN 752:2018 Drain and sewer systems outside buildings
- EN 12056-3:2000 Gravity drainage systems inside buildings. Roof drainage, layout and calculation

United States

- Low impact development (LID) practices

China

- Engineering technical code for rain utilization in building and sub-district (GB 50400-2006)

If the existing drainage is known then it should be modelled using best practice simulation modelling, to determine the 1-year and 100-year peak flow rates at discharge points (without allowing surcharge of the system above cover levels to drive greater flow rates through the discharge points).

If the system is not known, then the brownfield run-off should be calculated using the greenfield run-off models described above but with a Soil Type 5 (UK).

M2.2: Limiting discharge rate

Where limiting discharge is used to demonstrate compliance with criterion 7.b, the limiting discharge for each discharge point must based on the peak run-off rate from the pre-project condition for the relevant design event.

The calculation should include the total flow rate from the total area of the site feeding into the discharge point (this should include both BREEAM-assessed and non-BREEAM-assessed parts of the development, if applicable). The discharge point is defined as the point of discharge into the watercourse or sewers (including rivers, streams, ditches, drains, cuts, culverts, dykes, sluices, public sewers and passages through which water flows, see Definitions).

Where this calculation results in a peak flow rate of less than 5 L/s, the limiting discharge rate may be increased up to a level of no more than 5 L/s at the point of discharge from the site to reduce the risk of blockage.

For example, if the flow rate for the 1-year and 100-year events were 4 L/s and 7 L/s respectively, then the limiting discharges would be 5 L/s and 7 L/s. Similarly, if it was calculated to be 2 L/s and 4 L/s, then a maximum of 5 L/s limiting discharge rate could be applied to both discharge points.

Sites should not be subdivided to enable higher overall limiting discharge rates to be claimed. It is, however, recognised that some sites may require more than one discharge point as a result of the local topography or existing surrounding drainage infrastructure, and in such cases, the limiting discharge flow rate may be increased to a level no more than 5 L/s at each discharge point. The assessor should seek evidence that the number of discharge points is necessary, either due to topography, infrastructure limitations or both. Evidence may be in the form of a topographical map and an explanation from the appropriate consultant as to why multiple discharge points are required, stating that it is not feasible to have fewer discharge points.

M3: Surface water run-off – Volume

M3.1: Calculating volume of run-off

1. Where compliance is met using criterion 7.a:

   Demonstrate this through calculations for a 100-year, 6-hour event adjusted for climate change, timing the event at the end of the building's expected life.

   Prevent any additional predicted run-off volume for this event from leaving the site by using infiltration or other sustainable drainage system techniques (see also M3.2).

2. Where compliance is met using criterion 7.b:

   Justification must be from the appropriate consultant explaining why the requirements of criterion 7.a cannot be achieved, outlining why infiltration or other sustainable drainage system techniques are not technically viable.

   In such cases, drainage design measures must be specified that reduce the post-project peak rate of run-off to the limiting discharge (see M2.2).

M3.2: 100-year peak rate event – excess volume of run-off

The storage of excess flows from the 100-year event does not necessarily have to be contained within the sustainable drainage system or SuDS features (the features designed solely for the purpose of drainage). Where appropriate, storage of some or all of this volume can be achieved using temporary surface flooding of areas such as a playing field. Specific consideration should be given to overland flow routing. Overland flood flows and temporary storage of flood water on the surface must not pose a risk to the safe use of buildings or access routes.

Compliance notes

Ref	Terms	Description
Managing surface water run-off		
CN1	Discharge to the sea or tidal estuaries	The peak rate of run-off and volume run-off criteria can be deemed to be met by default if the site discharges rainwater directly to a tidal estuary or the sea. The site must discharge run-off directly into the tidal estuary or the sea, if these criteria are to be awarded by default. Typically, this would mean that drainage pipes would only carry run-off from the site and that they would not need to cross privately owned land outside the boundary of the development before reaching the sea. This compliance route does not remove the requirement to demonstrate compliance with criterion 6.
CN2	National best practice guidance on the design of sustainable drainage systems and rainwater harvesting systems	Please refer to the Approved Standards List to locate the appropriate national best practice standards in the country of assessment. Alternatively, please demonstrate applicability as follows: — The minimum requirements as set out in the Approved Standards List are covered by the proposed documents; OR

Ref	Terms	Description
		— Where appropriate standards do not exist for a country, the design team should demonstrate compliance with the UK or European standards as listed in each relevant country reference sheet.

Evidence

Criteria	Interim design stage	Final post-construction stage
Managing surface water run-off		
1	Appointment of an appropriate consultant and confirmation they are qualified in line with the definition.	Evidence to show an appropriate consultant was appointed.
2	Consultant's report confirming the site-specific surface water-run off design solutions, in line with the priority levels.	Final construction drawings or equivalent showing installed surface water drainage solutions.
3–4	Calculation results to show the pre-project and post-project peak rate of run-off. Surface water drainage report, statement or design drawings to confirm the proposed drainage design.	Calculation results to show the pre-project and post-project peak rate of run-off, updated where required. Details of installed drainage measures.
7–8	Volume calculations (100-year event). Justification for 7.b if used.	Volume calculations (100-year event). Justification for 7.b if used. Details of installed drainage measures.
5, 9	Relevant section or clauses of the building specification or contract. OR Letter of commitment.	Evidence to confirm that maintenance responsibilities have been defined for any SuDS solutions installed.
6	Information showing the proposed drainage solution, system failure flood flow routes, potential flood ponding levels and ground floor levels.	Information showing the proposed drainage solution, system failure flood flow routes, potential flood ponding levels and ground floor levels, updated with final construction evidence where the design has changed.

Definitions

Appropriate consultant

A consultant with qualifications and experience relevant to designing SuDS and flood prevention measures and completing peak rate of run-off calculations. Where complex flooding calculations and prevention measures are required, this must be a specialist hydrological engineer.

Catchment

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

Combined sewer

A sewer intended to receive both foul sewage and surface run off.

Current best practice planning guidance

The document should include independently published figures for an allowance for climate change (based on IPCC projections) according to the annual probability of flooding in the area.

Discharge point

The discharge point is the point at which the run-off from the site leaves the site boundary and enters a watercourse or sewer/storm drainage system.

Infiltration

The passage of water into a permeable surface, such as soil, permeable paving and soakaways.

Limiting discharge

The limiting discharge is based upon the calculated pre-project flow rate at a discharge point.

Peak run-off rate, Qp [m^3/s]

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-project

The condition of the site immediately prior to the commencement of refurbishment works, used as the baseline for calculating surface water run-off rates and volumes. Post-project, refers to the state after the refurbishment works have been completed.

Qbar

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

Rainwater discharge

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

Run-off

This is usually rainwater but can also be groundwater or overspill from sewers and other sources.

Safe access/egress routes

Routes intended to enable the safe movement of occupants, emergency responders, and essential personnel to and from assessed buildings during and immediately following a flood event.

Soakaways

A subsurface structure designed to promote the infiltration of surface water into 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; shallow structures providing infiltration in an extensive way (infiltration trenches and permeable paving) do not need oil separators.

Sustainable urban drainage systems (SuDS) management train

An approach to drainage design that combines a sequence of appropriate surface water drainage structures using SuDS systems for management of the run-off to treat the flow, reduce run-off volume and restrain the run-off rate in order to minimise man's impact on the environment. Additional benefits associated with operation and maintenance, ecology and amenity are aspects which are considered when designing a management system. The management train incorporates a hierarchy of techniques:

1. Source control. Examples of SuDS techniques include:
    - Soakaways
    - Porous or pervious paving
    - Roof water directed to garden (rather than piped drains)
    - Rainwater reuse
    - Green roofs
    - Other surface infiltration, attenuation and conveyance techniques that deal with run-off at source.
2. Site or local control. Examples of SuDS techniques include:
    - Swales
    - Pond
    - Infiltration basins

- Detention basin
- Larger soakaways
- Pervious (porous or permeable) paving.

3. Regional control. Examples of techniques include:
   - Balancing ponds
   - Wetlands
   - Large detention basin.

Sustainable urban drainage systems (SuDS) techniques

One or more components built to manage surface water run-off to prevent flooding and pollution, including for example: wet ponds, infiltration basins, detention basins, swales, reed beds, pervious (porous or permeable) paving, soakaways, rainwater reuse, filter strips, filter drains and trenches with or without perforates pipes, green roofs and underground attenuation storage. For more information refer to The SuDS manual.

For disambiguation of terms relating to SuDS and green infrastructure, see Figure 3 in *SUDS, LID, BMPs, WSUD and more – The evolution and application of terminology surrounding urban drainage* by Fletcher et al. (2015).(78) Available online at: https://doi.org/10.1080/1573062X.2014.916314

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.

Tidal estuary

A tidal estuary is defined as a semi-enclosed coastal body of water which has a free connection with the open sea and within which seawater is measurably diluted with fresh water derived from land drainage. An estuary should be unconstrained tidal waters, i.e. there should be no barriers or constricted shorelines that would restrict the free flow of water into the open sea in any conditions. The impact on the total volume of run-off from the site (and other sites which may in future discharge into the estuary) should be insignificant in terms of the overall water levels in the estuary. Tidal rivers (i.e. where no or limited measurable seawater content is present during normal tidal movements) cannot be included as part of the estuary for the purposes of BREEAM.

Volume of run-off

The volume of run-off that is generated by rainfall occurring on the site. This is typically measured in cubic metres. Additional predicted volume of run-off is the difference between the volumes of run-off pre-development and post-development.

Watercourses and sewers

A term that includes rivers, streams, ditches, drains, culverts, dykes, sluices, sewers and passages through which water flows.

Additional information

None.

Rsl 06 Increasing local resilience through the asset

(all buildings)

Aim

To reduce urban heat stress through nature-based and high-albedo cooling strategies, and to strengthen local community resilience by enabling the asset to contribute to the mitigation of identified local physical risks.

Overview

Assessment type	Credits available	Minimum standards	Applicable assessment criteria
Part 1: Fabric and structure	2	None	All (see ref 3.0)
Part 2: Core services	1	None	1–4 (see ref 1.0)
Part 3: Local services	1	None	1–4 (see ref 1.0)
Part 4: Interior design	2	None	All (see ref 3.0)

Assessment type specific notes

Ref	Assessment type specific note
1.0	**Part 2 and Part 3 only assessments** It is assumed that activities done in Part 2 or 3 cannot meaningfully contribute to community resilience and hence only criteria 1–4 are available. Even those are filtered out if the project does not include external works or roof works (see issue specific notes).

Building type specific notes

Ref	Building type specific note
-	None

Issue specific notes

Ref	Issue specific note
3.0	Reducing heat island effects (criteria 1–4) are not applicable where there are no external area works and no roof works within the scope of the project being assessed.

Assessment criteria

One credit – Reducing heat-island effects

1 Implement cooling measures in external areas and on roofs (see M1.1).

2 Estimate the expected reduction in peak-summer surface temperature and mean radiant temperature across the site's external areas, using recognised micro-climate modelling tools or other accepted calculation approaches, benchmarked against a fixed Conventional Baseline (see M1.2). The design must achieve a reduction in at least one of these two metrics relative to the baseline and must not result in an increase in the other.

3 Prepare a maintenance and monitoring plan that ensures long-term effectiveness of the cooling measures over the asset's life (see M1.3).

4 Prepare and submit a Heat Island Reduction report as defined in M1.4.

One credit – Community resilience contribution

5 Consultations with local administrative authorities and/or established community resilience groups inform the project team about local physical risks and identify how the asset can contribute to local resilience.

6 One or more physical or operational resilience measures are implemented that respond to consultation findings and mitigate the risk from identified hazards. See M2 for example community resilience measures.

7 Measures are installed and operational or commissioned for activation by practical completion.

8 A Community Communication Plan must outline how residents are informed of the existence of measures, their location, access conditions, and operation.

9 A signed declaration confirming operational readiness and community access provisions.

Methodology

M1: Reducing heat-island effects

M1.1: Cooling measures

Cooling measures are selected by giving priority to nature-based solutions wherever feasible. Where nature-based measures are not possible, high-albedo materials should be used.

Solutions should be integrated where possible with the surface-water management (drainage) strategy and the landscape and ecology management plan (Lue 05).

The following measures may be applied as part of the cooling strategy:

1. Vegetated systems, such as urban tree canopy, green roofs/walls, and rain gardens.
2. Water-retaining or evaporative features.
3. High-albedo hard-landscape or roof finishes with a high solar reflectance.

Where neighbourhood-scale modelling is undertaken, the analysis should estimate the off-site cooling footprint. The results, including the maximum off-site temperature reduction target and its approximate extent, must be reported.

M1.2: Conventional Baseline requirements

To avoid penalising projects in jurisdictions where greening measures are already mandated, the performance comparison must be made against a single fixed, conservative baseline that is independent of local planning policy. Use the following baseline conditions:

1. Land cover: 90% impervious hardscape; 10% bare soil (no vegetation, no irrigation) with an albedo of 0.17 and emissivity of 0.95 .
2. Paving: "Dark" asphalt or comparable, SRI =10.
3. Roofs: Conventional dark roofs (e.g., black EPDM), SRI = 3.
4. Walls: Conventional mass construction (e.g., concrete block or clay brick) with an albedo of 0.30 (i.e., solar absorptance of 0.7) and emissivity of 0.9.
5. No vegetated systems, water features or irrigation.
6. No targeted shading measures beyond building massing.
7. The baseline assumes the same building footprint, height, orientation and site coverage as the proposed project. Only the surface properties and land cover differ as defined above.
8. No anthropogenic heat from buildings, vehicles or equipment is included in either the baseline or the project model.

Where this comparison is undertaken using microclimate modelling, the input parameters representing these baseline conditions must be appropriate to the specified surfaces and derived from recognised, documented sources. Where standard tool default values are used, they must be verified against recognised published values. The parameters used, their sources, and the modelling tool and version must be recorded in the Heat Island Reduction report (see M1.4).

M1.3: Maintenance and monitoring plan

For criterion 3, the maintenance and monitoring plan must include:

1. The details of all responsible parties.
2. Annual cost estimates for routine maintenance upkeep.
3. Schedules for inspection, cleaning, irrigation, and component replacement.
4. Methods required to retain surface reflectivity or system functionality.
5. Plans for five-yearly performance reviews (using spot measurement or remote sensing), with corrective actions where targets are not met.

M1.4: Heat-island reduction report

The report will aid in research and development of future benchmarks by being diligent and transparent about the measures installed and the cooling targeted. At the minimum the report must include details about:

1. Project name.
2. Details of author of the report.
3. Modelling tool and version, method used, weather files/dataset and climate models used, and the justification for the tool and weather-data selection.
4. Baseline used, including the surface input parameters applied (reflectance, emittance, thermal and soil properties) and their sources.
5. Evaluation (pedestrian) height used for mean radiant temperature.
6. Expected cooling performance: for both surface temperature and mean radiant temperature, the baseline and proposed values, and the change in each (as area-weighted mean and maximum) across the external non-built area; and, where neighbourhood-scale modelling is undertaken, the off-site reduction and its extent.
7. External non-built area (m^2) and roofscape area (m^2).
8. Details of location and type of measures.
9. Percentage of external area covered.
10. Vegetation species and canopy assumptions.
11. Key assumptions (vegetation maturity, irrigation, maintenance).
12. Linked to drainage strategy? (Yes+How? / No+Why?).
13. Linked to landscape/ecology plan? (Yes+How? / No+Why?).

M2: Example community resilience measures

Include but are not limited to:

— **Emergency refuge spaces:** Accessible refuge areas within or adjacent to the building during extreme weather events.

— **Community resource access:** Potable water points, device or vehicle charging stations, communication facilities accessible during emergencies.

— **Cooling/warming spaces:** Publicly accessible areas providing thermal refuge during heatwaves or cold events.

— **Flood management infrastructure:** Permeable surfaces, water retention features, or elevated access routes that benefit surrounding properties.

— **Information/communication hubs:** Weather monitoring, early warning displays, or community notice systems.

— **Shared resilience infrastructure:** Emergency equipment storage, backup power systems with community access provisions.

Compliance notes

Ref	Terms	Description
Reducing heat-island effects		
CN1	Integration	Cooling and drainage functions may be delivered by the same element (e.g. bioswale, blue-green roof).
CN2	Micro-climate modelling	Acceptable tools must be capable of resolving, across the site's external areas, both quantities assessed under that criterion (peak-summer surface temperature and mean radiant temperature at pedestrian height) for the design condition. Suitable tools include ENVI-met, outdoor-configured CFD suites, or other industry-recognised or peer-reviewed tools or calculation methods. The tool or method should be appropriate to the site's scale, context and climate, and its suitability must be justified and documented. The modelling must be carried out for a near-extreme hot or heatwave condition representative of the site's climate zone, using weather data drawn from a recognised national or international source on a documented, risk-based basis. The weather-data sources and selection principles set out in 'Hea 05 Thermal comfort' may be applied. Where no recognised standard or dataset applies to the location, the basis of selection must be justified and documented. The chosen tool and method, the weather dataset and the justification for each must be reported under M1.4.
CN3	Small sites	For plots < 0.2 ha where detailed modelling is disproportionate, empirical calculators or peer-reviewed coefficients may be substituted with justification.
CN4	Modelling consistency	In addition to the geometry assumptions in M1.2, the baseline and proposed models must use the same domain, grid resolution, meteorological forcing and simulation period. The conventional baseline land cover must be applied to the external non-built ground area, excluding building footprints.
CN5	Evaluation of results	Surface temperature and mean radiant temperature must be evaluated across the external non-built area under peak-summer conditions (see CN2), with mean radiant temperature taken at a defined pedestrian height that is recorded (M1.4) and applied consistently to both models. Compliance with criterion 2 must be assessed on the area-weighted mean across that area and the maximum should also be reported.
Community resilience contribution		
CN6	Integration	Measures may be integrated within building systems or provided as standalone site additions.
CN7	Local community boundary	Local community is defined as the administrative council ward or parish or equivalent local administrative boundary (municipality, commune, ward etc.).
CN8	Scale proportionality	Consultation and communication requirements should be proportionate to the asset's scale; extensive plans are not mandatory.
CN9	Local adaptation plan alignment	Where formal local adaptation plans exist, measures should align with identified priorities; otherwise consult. Where there are areas of non-alignment, these must be justified based on consultation findings.
CN10	Maintenance consideration	Proposed solutions must demonstrate consideration for long-term operation, maintenance, and funding.

Evidence

Criteria	Interim design stage	Final post-construction stage
Reducing heat-island effects		
1	Design drawings and/or relevant sections of the building specification confirming proposed cooling measures, their locations and details of any vegetation, substrates, water features and high-albedo materials (including SRI certificate)	Final construction drawings or equivalent or assessor site inspection report and photographic evidence showing installed cooling measures. Commissioning certificates for water/irrigation systems. Vegetation establishment report (≥ 90% survival at practical completion). Material compliance sheets confirming installed SRI.
2	Modelling calculation results.	No further actions required post-construction.
3	Copy of the draft maintenance and monitoring plan.	Final maintenance and monitoring plan and agreements.
4	Copy of a compliant Heat Island Reduction report.	Copy of a compliant Heat Island Reduction report, updated as required.
Community resilience contribution		
5–9	Consultation records or summary report identifying all consultees, local risks, and how the asset can contribute to local resilience. Design drawings and/or relevant sections or clauses of the building specification or contract which confirm the proposed community resilience measures. Where local adaptation plans exist: Provide an alignment statement or justification for any areas of non-alignment with the plan (CN9). Draft Community Communication Plan.	Final construction drawings or equivalent or assessor site inspection report and photographic evidence showing installed measures. Commissioning records to confirm all systems are fully operational. Evidence to demonstrate that residents have been informed in accordance with the Community Communication Plan (e.g. leaflets or website screenshot). Signed declaration from the client or responsible party confirming operational readiness and access arrangements in place.

Definitions

Albedo

The proportion of sunlight (solar radiation) reflected by a surface or object, often expressed as a percentage. Clouds, snow and ice usually have high albedo; soil surfaces cover the albedo range from high to low; vegetation in the dry season and/or in arid zones can have high albedo, whereas photosynthetically active vegetation and the ocean have low albedo. The earth's planetary albedo changes mainly through changes in cloudiness, snow, ice, leaf area and land cover.

Nature-based solutions (NbS)

The International Union for Conserving Nature (IUCN) defines NbS as: "actions to protect, sustainably manage and restore natural or modified ecosystems that address societal challenges effectively and adaptively, simultaneously providing human wellbeing and biodiversity benefits".

Neighbourhood scale modelling

Neighbourhood-scale modelling is a localized microclimate evaluation used to evidence site-wide design measures that mitigate the Urban Heat Island effect and optimize external thermal comfort across large sites.

Peak summer

The near-extreme hot or heatwave condition, representative of the site's climate zone, against which the assessment under criterion 2 is carried out – an extreme warm period rather than a typical or average summer. It is derived from recognised hot-summer weather data of the kind used for overheating risk assessment, such as CIBSE Design Summer Year (DSY) files in the UK (years containing hot weather events, of which DSY2 and DSY3 represent the most intense and the longest warm spells) or an equivalent national or international dataset. The weather data used, and the basis for its selection, are specified in CN2).

Solar Reflectance Index (SRI)

Solar Reflectance Index (SRI) is a composite metric used to specify high-performance surface materials that minimize solar heat absorption and maximize thermal re-radiation, directly reducing the site's contribution to the Urban Heat Island effect.

Urban heat island (UHI)

The relative warmth of a city compared with surrounding rural areas, associated with heat trapping due to land use, the configuration and design of the built environment, including street layout and building size, the heat-absorbing properties of urban building materials, reduced ventilation, reduced greenery and water features, and domestic and industrial heat emissions generated directly from human activities.

Additional information

A practical guide to cool roofs and cool pavements

A Practical Guide to Cool Roofs and Cool Pavements

https://heathealth.info/wp-content/uploads/CoolRoofToolkit_Full.pdf

Waste



Summary

This category encourages the sustainable management (and reuse where feasible) of construction and operational waste and waste through future maintenance and repairs associated with the building structure. By encouraging good design and construction practices, issues in this section aim to reduce the waste arising from the construction and operation of the building, encouraging its diversion from landfill. It includes recognition of measures to reduce future waste as a result of the need to alter the building in the light of future changes to climate.

Assessment issues

Wst 01 Construction waste management	4 credits + 1 exemplary
Wst 02 Recycled aggregates	1 credit + 1 exemplary
Wst 03 Operational waste	1 credit
Wst 04 Speculative finishes	1 credit
Wst 06 Disassembly and adaptability	2 credits

Wst 01 Construction waste management

(all buildings)

Aim

To promote resource efficiency via the effective and appropriate management of construction waste.

Overview

Assessment type	Credits available	Minimum standards	Applicable assessment criteria
Part 1: Fabric and structure	4 + 1 exemplary	Outstanding	All
Part 2: Core services	4 + 1 exemplary	Outstanding	All
Part 3: Local services	4 + 1 exemplary	Outstanding	All
Part 4: Interior design	4 + 1 exemplary	Outstanding	All
EU Taxonomy	-	-	All (see M4)

Assessment type specific notes

Ref	Assessment type specific note
-	None

Building type specific notes

Ref	Building type specific note
-	None

Assessment criteria

One credit – Pre-refurbishment audit

1 Complete a pre-refurbishment audit of any existing buildings, structures or hard surfaces within the scope of the refurbishment or fit-out zone. This must be used to determine whether refurbishment or reuse is feasible and, in the case of demolition, to maximise the recovery of material for subsequent high grade or value applications. The audit must cover the content of M1: Pre-refurbishment audit scope on the next page and:

1.a Be carried out at Concept Design stage by a competent person prior to strip-out or demolition works.

1.b Guide the design, consider materials for reuse and set targets for waste management.

1.c Engage all contractors in the process of maximising high-grade reuse and recycling opportunities.

2 Make reference to the audit in the resource management plan (RMP).

3 Compare actual waste arisings and waste management routes used with those forecast and investigate significant deviations from planned targets.

Up to two credits – Construction resource efficiency

One credit

4 Prepare a compliant resource management plan (see M2) covering:

4.a Non-hazardous waste materials (from on-site construction and dedicated off-site manufacture or fabrication), including demolition and excavation waste.

4.b Accurate data records on waste arisings and waste management routes.

5 Set appropriate targets (see M3) for non-hazardous and hazardous waste produced on site in m^3 of waste per 100 m^2 or tonnes of waste per 100 m^2.

6 Using the collated data, report the amount of waste generated per 100 m^2 (gross internal floor area) in m^3 (where volume is actual volume of waste, not bulk volume) or tonnes from the construction process via the BREEAM Platform.

One credit

7 Achieve criteria 1 to 6 (where applicable).

8 Procedures are in place for sorting, reusing and recycling construction waste into at least five defined waste groups (see Table 96 on page 368) either on site or off-site through a licensed external contractor.

One credit – Diversion from landfill

9 A significant quantity of non-hazardous refurbishment/fit-out and demolition waste (where applicable) generated by the project has been diverted from landfill according to the figures within Table 95 below.

10 Waste materials will be sorted into separate key waste groups (according to the waste streams generated by the scope of the works) either on site or off-site through a licensed contractor for recovery (see Table 96 on page 368 for information on waste groups).

Table 95: BREEAM targets for diversion from landfill

BREEAM credits	Source of waste	Amount of waste diverted from landfill	
		Volume	Weight (Tonnage)
One credit	Refurbishment/fit-out	75%	80%
	Demolition	80%	85%
Exemplary level	Refurbishment/fit-out	95%	97%
	Demolition	95%	97%

One exemplary credit – Diversion from landfill

11 Achieve criteria 1 to 10 (where applicable).

12 The percentage of non-hazardous refurbishment/fit-out and demolition waste (if relevant) diverted from landfill meets or exceeds the exemplary level benchmark (in Table 95 above).

Methodology

M1: Pre-refurbishment audit scope

The pre-refurbishment audit must cover:

1. Identification and quantification of the key materials where present on the project (see Table 96 on page 368).
2. Potential applications and any related issues for the reuse and recycling of the key materials in accordance with the waste hierarchy.
3. Opportunities for reuse and recycling within the same development.
4. Identification of local re-processors or recyclers for recycling of materials.

5. Identification of overall recycling targets where appropriate.
6. Identification of reuse targets where appropriate.
7. Identification of overall landfill diversion rate for all key materials.

M2: Resource management plan

A resource management plan (RMP) 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 site and off site. A compliant RMP defines:

1. A target benchmark for resource efficiency, i.e. m^3 of waste per 100 m^2 or tonnes of waste per 100 m^2.
2. Procedures and commitments to minimise non-hazardous waste in line with the target benchmark.
3. Procedures to minimise hazardous waste.
4. A waste-minimisation target and details of waste minimisation actions to be undertaken.
5. Procedures to estimate, monitor, measures and report on hazardous and non-hazardous site waste and demolition waste, where relevant, arising from work carried out by the principal contractor and all subcontractors. Waste data obtained from licensed external waste contractors needs to be reliable and verifiable.
6. Monthly reporting of all construction waste data throughout the project checked against what would be expected based on the stage of the project, invoices, etc., to validate completeness of waste reporting data.
7. Procedures to sort, reuse and recycle construction waste into defined waste groups, either on site or through a licensed external contractor.
8. Procedures to review and update the plan.
9. The name or job title of the individual responsible for implementing the above.

M3: Appropriate targets

Appropriate targets for waste generation and resource efficiency must reflect the nature and scale of the refurbishment and fit-out works, the materials affected, and the realistic opportunities for reuse and recovery of existing elements.

Targets should be:

1. Evidence-based, using one or more of the following sources:
    a. Published benchmarks or best practice data for refurbishment and fit-out projects.
    b. Verified data from comparable completed projects.
    c. Organisational or corporate resource efficiency targets.
2. Ambitious yet achievable, demonstrating a clear improvement over standard practice and promoting continuous performance improvement in material efficiency and waste reduction.
3. Relevant to the project scope, considering the degree of refurbishment or strip-out involved and the potential for reuse of retained elements (e.g. façades, internal partitions, services, finishes, or furniture).
4. Expressed as m^3 or tonnes of waste per 100 m^2 of gross internal floor area (GIA), distinguishing between:
    a. Refurbishment works (which may include demolition and structural alterations); and
    b. Fit-out works (focused on interior finishes, furniture, and building services).
5. Justified by the design or project team, explaining the rationale for the selected targets and how they align with project scope, site conditions, and material reuse strategies.

Where demolition or excavation waste is generated, it may be reported separately for transparency, but should not be used to normalise overall waste-generation benchmarks due to project-specific variation.

M4: EU Taxonomy

In order to fully comply with EU Taxonomy requirements, it will need to be confirmed that the following requirements have also been addressed:

a. At least 70% (by weight) of the non-hazardous construction and demolition waste (excluding naturally occurring material referred to in category 17 05 04 in the European List of Waste established by Decision 2000/532/EC) generated on the construction site is prepared for reuse, recycling and other material recovery, including backfilling operations using waste to substitute other materials, in accordance with the waste hierarchy and the EU Construction and Demolition Waste Management Protocol.

b. Operators limit waste generation in processes related to construction and demolition, in accordance with the EU Construction and Demolition Waste Management Protocol and taking into account best available techniques and using selective demolition to enable removal and safe handling of hazardous substances and facilitate reuse and high-quality recycling by selective removal of materials, using available sorting systems for construction and demolition waste.

Compliance notes

Ref	Terms	Description
CN1	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 or recycled as appropriate.
CN2	Waste from temporary support structures	Some projects require temporary works that fall outside the scope of normal construction methods or practices, for example, projects that require bespoke temporary steelwork supports for façade retention. If it can be demonstrated that the components and materials used will be either reused or, if this is not possible, recycled after use then these may be excluded from the construction waste reduction and diversion from landfill assessments of this issue. However, the strategy for ensuring resource efficient design of the temporary works and an explanation of the reuse or recycling of the materials concerned must be reported in the resource management plan, including a full justification for exemption, and provided to BRE Global. This justification will be reviewed by BRE Global on a case-by-case basis and must be approved prior to these credits being awarded.
CN3	Excavation waste	Excavation waste should not be included and assessed against the requirements under 'Diversion from landfill'.
CN4	Contractor not yet appointed at the design stage	Where the contractor has not been engaged at design stage certification, it is acceptable to award the credits based on a commitment. This commitment must be from a suitable member of the design team and must detail the targets and criteria which must be met. Evidence must also confirm that the details in the commitment will form part of the contractual requirements. Note: This does not apply to the requirement for a pre-demolition/pre-refurbishment audit, which must be undertaken at Concept Design stage.

Evidence

Criteria	Interim design stage	Final post-construction stage
Pre-refurbishment audit		
1–3	Copy of compliant pre-refurbishment audit.	Updated pre-refurbishment audit, including actual waste results.
Construction resource efficiency		
4–7	Copy of compliant resource management plan	Records of actual waste arisings from site.

Criteria	Interim design stage	Final post-construction stage
	(RMP) including appropriate targets for construction waste produced. Where contractor is not yet appointed, credits may be awarded based on a contract requirement or letter of commitment from the client or developer.	
8	Confirmation of procedures in place for sorting, reusing and recycling construction waste.	Records to show that construction waste was sorted into at least 5 waste streams.
Diversion from landfill		
9–12	Relevant section or clauses of the building specification or contract. OR A letter of commitment from the client or developer. OR Copy of RMP which includes relevant commitments/targets and procedures to divert waste from landfill.	Records of actual waste arisings from site, amount diverted from landfill and how this has been processed i.e. recycled, reused, etc. Evidence of waste transfer station recycling rates, where applicable. Confirmation of how waste was sorted into the key waste groups. Data to be separated for demolition and construction waste.
EU Taxonomy		
M4	Evidence to show how waste generation was limited in accordance with the EU Construction and Demolition Waste Management Protocol such as waste management procedures and waste records.	Evidence to show how waste generation was limited in accordance with the EU Construction and Demolition Waste Management Protocol such as waste management procedures and waste records.

Definitions

Competent person – Pre-refurbishment audit

An individual who has appropriate knowledge of buildings, waste and options for reuse and recycling of different waste streams. Ideally this would be a demolition contractor but could also be the main contractor.

Dedicated off-site manufacturing or fabrication

Production of a component or material carried out in an off-site manufacturing or processing facility specifically set up for the development project.

Diversion from landfill

Diversion from landfill includes:

1. Reusing the material on site (in situ or for new applications).
2. Reusing the material on other sites.
3. Salvaging or reclaiming the material for reuse.
4. Returning material to the supplier via a 'take-back' scheme.
5. Recovery of the material from the site by an approved waste management contractor and subsequently being recycled or sent for energy recovery.

Inert waste

Waste is considered inert if:

1. It does not undergo any significant physical, chemical or biological transformations;
2. It does not dissolve, burn or otherwise physically or chemically react, biodegrade or adversely affect other matter with which it comes into contact in a way likely to give rise to environmental pollution or harm to human health; and
3. Its total leachability and pollutant content and the ecotoxicity of its leachate are insignificant and, in particular, do not endanger the quality of any surface water or groundwater (taken from the European Community (EC) Directive 1999/31/EC on the landfill of waste).

Resource management plan (RMP)

A resource management plan (RMP) 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 site and off site. Details of compliant resource management plans for BREEAM are given in M2.

Additional information

Best practice construction waste management plan

Best practice is a combination of commitments to:

1. Design out waste (materials optimisation).
2. Reduce waste generated on site.
3. Develop and implement procedures to sort and reuse and recycle construction and demolition waste on site and off site (as applicable).
4. Follow guidance from relevant national waste framework directives.

Construction waste groups

Projects must identify and record the main waste groups generated during the refurbishment and/or fit-out works, selecting those most relevant from Table 96 below. The intent is to encourage segregation of waste at the highest practicable level, maximise opportunities for reuse and recycling, and minimise the proportion of mixed or residual waste sent to landfill. At least five key waste groups should be tracked and reported.

Table 96: Key waste group examples

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, board products such as plywood, chipboard, medium density fibreboard (MDF)
1602	Electrical and electronic equipment	Electrical and electronic TVs, fridges, air-conditioning units, lamps equipment
1301	Oils	Hydraulic oil, engine oil, lubricating oil
1703	Asphalt and tar	Bitumen, coal tars, asphalt
170103	Tiles and ceramics	Tiles, bricks, ceramic, sanitary ware
1701	Inert	Mixed rubble or excavation material, glass
1704	Metals	Radiators, cables, wires, bars, sheet
170802	Gypsum	Plasterboard, render, plaster, cement, fibre cement sheets, mortar
170101	Binders	Render, cement, mortar
170203	Plastics	Pipes, cladding, frames, non-packaging sheet
1705	Soils	Soils, clays, sand, gravel, natural stone

European Waste Catalogue	Key group	Examples
Most relevant EWC	Liquids	Non-hazardous paints, thinners, timber treatments
Most relevant EWC	Hazardous	As defined in national legislation or as defined in the Hazardous Waste List (HWL) of the European Waste Catalogue (EWC). Compliance is required with the more onerous of the two.
Most relevant EWC	Floor coverings (soft)	Carpets, vinyl flooring
Most relevant EWC	Architectural features	Roof tiles, reclaimed bricks, fireplaces
170904 (mixed)	Mixed or other	Efforts should be made to categorise waste into the above categories wherever possible.

SmartWaste

SmartWaste is an online environmental reporting tool for the construction industry. It enables organisations to efficiently capture, monitor and report on:

- Waste (including site waste management plans and pre-demolition audits)
- Energy (including conversion to carbon dioxide emissions)
- Water
- Responsible sourced materials (including timber)
- Transport
- Considerate Constructors Scheme

Used to meet the criteria of this issue and as a source of evidence for demonstrating compliance, SmartWaste helps organisations to reduce their environmental impacts, making substantial time and cost savings.

More information about SmartWaste can be found at: www.smartwaste.co.uk.

Wst 02 Recycled aggregates

(all buildings)

Aim

To recognise and encourage the use of recycled and secondary aggregates, thereby reducing the demand for virgin material and optimising material efficiency in construction.

Overview

Assessment type	Credits available	Minimum standards	Applicable assessment criteria
Part 1: Fabric and structure	1 + 1 exemplary	None	All
Part 2: Core services	0	None	Not applicable
Part 3: Local services	0	None	Not applicable
Part 4: Interior design	0	None	Not applicable

Assessment type specific notes

Ref	Assessment type specific note
-	None

Building type specific notes

Ref	Building type specific note
-	None

Assessment criteria

One credit – Recycled aggregates

1 At least 25% of the high grade aggregate uses (within the development) are provided by secondary or recycled aggregate. This percentage can be measured using either weight or volume.

2 The recycled or secondary aggregates are EITHER

2.a Construction, demolition and excavation waste obtained on site or off-site OR

2.b Secondary aggregates.

One exemplary credit – Recycled aggregates

3 Where the total amount of recycled or secondary aggregate specified is greater than 50% (by weight or volume) of the total high grade aggregate specified for the project.

4 The contributing recycled or secondary aggregate must not be transported more than 30 km by road transport.

Methodology

None.

Compliance notes

Ref	Terms	Description
CN1	Recycled aggregates in concrete	Where national building regulations limit the use of recycled aggregates in concrete (typically applicable to bound aggregate uses as listed), the responsibility for achieving this credit is on the unbound uses (please note that the total aggregate figure must still include the bound uses).
CN1.1	National restrictions on the use of recycled aggregates	In countries where the use of recycled aggregates is restricted, this credit cannot be achieved by default. In countries where there is a maximum permitted regulatory level of less than 50% recycled aggregate, the exemplary credit can be achieved where the percentage of recycled aggregates used is greater than or equal to 35%. Where there is no maximum regulatory level, the 50% requirement must be achieved in order to award this credit.
CN1.2	National best practice guidance on defining granular fill and capping as a high grade use	The Approved Standards list will confirm any approved national standards regarding the use of high-grade materials. Where none have been approved, Checklist A6 should be used to confirm compliance. This should then be submitted to BRE for approval and the Approved Standards will be updated.
CN1.3	Off-site recycled aggregates	Where off-site recycled aggregates from construction, demolition and excavation waste are used, they should be produced according to the relevant standards for aggregates.
CN1.4	Aggregates in off-site manufactured applications	Where high grade aggregate uses have been incorporated into applications manufactured off-site, the aggregate present in these applications should be included in the assessment of this issue.
CN1.5	Air-cooled blast furnace slag as a secondary aggregate (EU projects)	Air-cooled blast furnace slag is classified as a byproduct (rather than a waste) and can therefore be used as an aggregate without the need for a quality protocol. The slag used must meet the requirements of the European and aggregates standards that apply to the end use application (e.g. bitumen bound, unbound etc.).
CN1.6	Existing materials recycled on site	When existing elements are recycled on site (i.e. crushed and used as high grade aggregate), they can contribute to awarding credits as recycled aggregates.
CN1.7	No high grade aggregates used on project	Where no high grade aggregates will be used in a refurbishment scheme project, this credit is not applicable and will be filtered out of the assessment. In the Refurbishment and Fit Out scheme, existing structural elements are generally retained, therefore it would not be appropriate to account for the aggregate within these.

Evidence

Criteria	Interim design stage	Final post-construction stage
All	Relevant section and clauses of the building specification or contract. Project team calculations. AND Where available, documentation confirming the source of recycled or secondary aggregates and that the required amount can be provided. Confirmation of any national best practice or standard defined on the Approved Standards List.	Calculations detailing the weights (or volumes) and types of aggregate provided for each application. Delivery notes (or confirmation from the supplier) of the types and quantities of aggregates provided on site. Confirmation that the materials meet the appropriate standard as defined in the Approved Standards List.

Definitions

High grade aggregate uses

High grade aggregate uses are considered to be:

Bound

1. Structural frame
2. Floor slabs including ground floor slabs
3. Bitumen or hydraulically bound base, binder, and surface courses for paved areas and roads

Unbound

1. Asphalt-based or similar road surfaces
2. Granular fill and capping (for roadworks, not building foundations)
3. Pipe bedding
4. Sub bases and building foundations
5. Gravel landscaping

Recycled aggregates

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

Secondary aggregates are usually by-products of other industrial processes that have not previously been used in construction. Examples include:

1. China clay waste
2. Slate overburden
3. Pulverised fuel ash (PFA)
4. Ground granulated blast furnace slag (GGBFS)
5. Air-cooled blast furnace slag
6. Steel slag
7. Furnace bottom ash (FBA)
8. Incinerator bottom ash
9. Foundry sands
10. Recycled glass
11. Recycled plastic
12. Spent oil shale
13. Colliery spoil
14. Municipal solid waste treatment residues

Additional information

None.

Wst 03 Operational waste

(all buildings)

Aim

To encourage the recycling of operational waste through the provision of dedicated storage facilities and space.

Overview

Assessment type	Credits available	Minimum standards	Applicable assessment criteria
Part 1: Fabric and structure	1	Excellent	All
Part 2: Core services	0	None	Not applicable
Part 3: Local services	0	None	Not applicable
Part 4: Interior design	1	Excellent	All

Assessment type specific notes

Ref	Assessment type specific note
1.0	**End-occupier not known** If the end-occupier is not known, but the functions or areas of the assessed building suggest that large amounts of packaging or compostable waste is likely to be generated during the building's operation, e.g. it is a retail or industrial project or contains a large catering facility, then an appropriately sized space and services or infrastructure to accommodate the relevant facilities must be provided. The facilities themselves do not necessarily need to be provided or installed to demonstrate compliance.

Building type specific notes

Ref	Building type specific note
2.0	**Small industrial units** For an industrial building or development or site consisting of a number of smaller units, each ≤ 200 m² floor area, shared facilities that meet the criteria for the building or site as a whole are sufficient to achieve the credit.
2.1	**Shopping centres, retail parks and wider site or campus developments** For shopping centres and retail parks there must be adequate space to cater for each tenant and their potential recyclable waste volumes. Tenants that occupy a large proportion of the centre, i.e. 'flagship or anchor tenants', must have their own dedicated compliant facilities. For smaller non-flagship tenant units, compliant central or common facilities on site or dedicated spaces for individual units will meet the assessment criteria for this BREEAM issue.
2.2	**Residential institution (long-term stay) – Home composting information leaflet** The leaflet must provide information on: — How composting works and why it is important; — The materials that can be composted (e.g. raw vegetable peelings and fruit, shredded paper, tea bags, etc.); and — Details of the operation and management plan for the communal composting scheme. Where a green or kitchen waste collection scheme is in operation, the information leaflet provided by the local authority is sufficient to meet the information leaflet criteria.
2.3	**Residential institution (long-term stay) – Supported living facility** Where it is not possible to locate the recycling bins within a communal area, which is accessible to residents, for safety reasons (e.g. where the residents have mental health problems and free access to these facilities would

Ref	Building type specific note
	pose significant risk of self-harm or harm to others) it is acceptable to locate them within a dedicated non-obtrusive position accessible to staff only, but in close proximity to the areas where recyclable waste material is generated.
2.4	**Residential institutions (short-term stay)** The additional criteria for Residential institutions are not applicable to Residential institutions (short-term stay).
2.5	**Healthcare buildings and country-specific guidance (UK only)** In addition to the standard criteria, the waste facilities are compliant with the relevant NHS guidelines for that part of the UK. **England** Use HTM 07-01 (England version) where the criterion refers to the use of relevant NHS guidelines for the country. **Northern Ireland** Use HTM 07-01 (Northern Ireland version) where the criterion refers to the use of relevant NHS guidelines for the country. **Scotland** Use SHTN3 NHS Scotland Waste Management guidance Part A-Best Practice Overview and Part B Waste Management Policy template where the criterion refers to the use of relevant NHS guidelines for the country. **Wales** Use WHTM07-01 Safe management of healthcare (Wales) where the criterion refers to the use of relevant NHS guidelines for the country.

Assessment criteria

One credit – Operational waste

1 Provide a dedicated space, identified by clear signage, for the segregation and storage of operational recyclable waste volumes generated by the assessed building or unit, its occupants and activities (see M1, M2, and M3). This space must be:

1.a Clearly labelled for long-term durability, to assist with segregation, storage and collection of the recyclable waste streams.

1.b Accessible to building occupants or facilities operators for the deposit of materials and collections by waste management contractors.

1.c Of a capacity appropriate to the building type, size, number of units (if relevant) and predicted volumes of waste that will arise from daily or weekly operational activities and occupancy rates.

2 Where the consistent generation in volume of the appropriate operational waste streams is likely to exist, e.g. large amounts of packaging or compostable waste generated by the building's use and operation, the following facilities are provided:

2.a Static waste compactors or balers; situated in a service area or dedicated waste management space.

2.b Vessels for composting suitable organic waste resulting from the building's daily operation and use; OR adequate space for storing segregated food waste and compostable organic material prior to collection and delivery to an alternative composting facility.

2.c Where organic waste is to be stored or composted on site, a tap is provided adjacent to or within the facility for cleaning and hygiene purposes.

Additionally for Residential institutions (long-term stay) with self-contained dwellings only

3 Each dwelling has a provision of three internal storage containers, as follows:

3.a A minimum total capacity of 30 litres.

3.b No individual container smaller than 7 litres.

3.c All containers in a dedicated non-obstructive position.

3.d The storage containers for recycling are provided in addition to non-recyclable waste storage.

4 Home composting facilities and a home composting information leaflet are provided within the kitchen area or communal space for each self-contained dwelling or bedsit.

Additionally for Residential institutions (long-term stay) with individual bedrooms and communal facilities only

5 The above storage requirements (criterion 3 on the previous page) for self-contained dwellings or bedsits are met for every six bedrooms.

6 The recyclable storage is located in a dedicated non-obstructive position in either:

6.a Communal kitchens OR

6.b Where there are no communal kitchens present, in a communal space such as communal lounges or utility areas.

7 Home composting facilities and a home composting information leaflet are provided within the kitchen area or communal space for each individual bedroom, bedsit, or communal kitchen.

Additionally for healthcare buildings only (UK only)

8 The specified or installed operational waste facilities are compliant with the relevant NHS guidelines for that part of the UK.

Methodology

M1: Determining if the dedicated space complies

See criteria 1 and 2 on the previous page.

The design team demonstrates that the provision of waste management facilities for the assessed building is adequate given the building type, occupier (if known), operational function and likely waste streams and volumes to be generated.

Where it is not possible to determine what provision should be made, the following guide for minimum storage space provision should be used:

Buildings < 5000 m²

— At least 2 m² per 1000 m² of net floor area

OR

— 4 m² per 1000 m² of net floor area where commercial-scale catering is provided

Buildings ≥ 5000 m²

— A minimum of total of 10 m²

OR

— 20 m² where commercial-scale catering is provided

The net floor area should be rounded up to the nearest 1000 m².

M2: General waste

The area for storage of recyclable materials must be provided in addition to areas and facilities provided for dealing with general waste and other waste management facilities, e.g. compactors, balers and composters.

M3: Internal storage areas

Where the facilities are situated internally, vehicular gate heights and widths and manoeuvring and loading space must be sized to ensure ease of access for vehicles collecting recyclable materials.

Compliance notes

Ref	Terms	Description
CN1	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 recyclable waste arising from the new and existing buildings.
CN2	Multiple building	Where the assessment applies to one or more buildings or units that are part of a wider

Ref	Terms	Description
	assessments and buildings that form part of a wider estate	estate or campus, the design team can choose to demonstrate compliance through the provision of dedicated centralised storage space and waste management facilities with the capacity to accommodate the recyclable waste material generated from all buildings and their activities.
CN3	Limited space or vehicle access for a compactor or baler	For sites that have limited space for static installations, compliance can be assessed on the basis of the provision of adequate space for a smaller portable compactor or baler.
CN4	Automated waste collection systems	These are accepted as a form of compliance as long as a management plan is in place, which can either be public (local authority) or private and requirements for separation are met.
CN5	Labelling and signage where provision of waste bins is out of scope	Where the provision of waste bins is outside the scope of the developer, it is clearly not possible to label the bins. In this situation, the following compliance options are available: 1. Provide compliant signage to the storage area and label bin spaces within the storage area according to the relevant waste streams. 2. Where future waste streams are unknown, provide compliant signage to the storage area and a written commitment from the developer to ensure that the bins and/or bin spaces are labelled. It is recognised that the bins may be provided by the tenant, local authority or waste management company after the time of certification.
CN6	Signage for the recycling area	Labelling of the recycling areas is required to alert building users and collection agencies to the location of the recycling facility.

Evidence

Criteria	Interim design stage	Final post-construction stage
Operational waste		
1	Design drawings or relevant section of the building specification or contract clauses to confirm the provision of compliant dedicated facilities for the storage and segregation of recyclable waste, in addition to provisions for general waste. Confirmation from end user or design team of predicted waste streams and indicative volumes. OR Where not known, calculations used to confirm the minimum space required.	Final construction drawings or equivalent to confirm the location and size of the waste storage areas provided. Assessor site inspection report with photographic evidence to verify the installation of compliant waste storage facilities which are clearly labelled.
2	Where applicable to the building, design drawings or relevant section of the building specification or contract clauses to confirm the provision of compactors or balers or compliant organic waste storage where relevant.	Final construction drawings or equivalent and assessor site inspection report with photographic evidence to verify the installation of compliant compactors, balers or organic waste storage facilities where required.
Additionally for Residential institutions (long-term stay)		
3–7	Design drawings or relevant section of the building specification or contract clauses to confirm the provision of compliant internal recyclable waste storage and home composting facilities. Commitment to provide home composting information leaflets.	Final construction drawings or equivalent to confirm the location of the storage to each home or kitchen type. Assessor site inspection report with photographic evidence or proof of purchase such as purchase orders to confirm that the compliant internal recyclable waste storage is provided.

Criteria	Interim design stage	Final post-construction stage
		Manufacturer's product data to confirm the size of the containers provided. Copy of home composting information leaflet and confirmation to show these have been issued as required.

Definitions

Accessible space

Accessible space is typically within 20 m of a building entrance. Depending on the size of the building, site restrictions or tenancy arrangements, it may not be possible for the facilities to be within 20 m of a building entrance. In such circumstances, judgment on whether the space is 'accessible' to the building occupants and vehicle collection must be made.

Automated waste collection system

A system that allows for waste separation at the source, for different types of waste and from multiple locations, with enhanced hygienic, occupational health and safety standards. It also reduces the use of waste transport by lorries, reducing nuisance and CO_2 emissions, from fossil fuel consumption. Some companies now offer a fully automated underground system to collect, sort, and transport waste.

Dedicated non-obstructive position

An easily accessible cupboard under the sink or any other cupboard in the kitchen, next to the storage or likely area for storing non-recyclable waste, where practical. Where a kitchen cupboard location is not possible the bins can be located near to the kitchen, in a utility room or connected garage, for example.

Flagship or anchor tenant

A flagship or anchor tenant is the largest and most prominent tenant in a commercial property, such as a shopping centre, whose main purpose is to draw customers to the location. Examples include major department stores or grocery stores, and their presence makes the property more attractive to other, smaller businesses.

Home composting facilities

Home composting facilities are individual composting containers placed within the kitchen area or communal space for each self-contained dwelling, bedsit or communal kitchen. These containers are either emptied into local on-site communal facilities or are collected by composting collection services run by the waste collection authority.

Individual composting containers should be:

1. Located in a dedicated, non-obstructive position.
2. Easily accessible to all users.
3. Durable, low maintenance and cleanable.
4. Enclosed to manage odour and pest issues.

Waste compactor or baler

A machine that is designed to compress waste streams in order to improve storage and transport efficiency.

Additional information

Recyclable storage space

The following footprint dimensions can act as a guide when determining size and accessibility criteria for the recyclable storage space:

1. Compactor dimensions: about the size of one car parking bay, 4.8 m × 2.4 m
2. Skip: the footprint of an 8 and 12 cubic yard skip measures 3.4 m × 1.8 m; therefore allow a minimum of 2.0 m width and 4.0 m length or 8 m² area for the storage and access of such containers

3. Wheeled bins:
    - 360 litre = 0.86 m × 0.62 m
    - 660 litre = 1.2 m × 0.7 m
    - 1100 litre = 1.28 m × 0.98 m
4. Roll-on/roll-off containers: allow a minimum of 6.1 m × 2.4 m
5. Vehicle access: the following are dimensions for lorry types that are typically used to collect waste. Therefore, gate heights and widths should not be smaller than these measurements:
    a. Dustcart (medium capacity): length = 7.4 m, height = 4 m, width 3.1 m
    b. Skip lorry: length = 7 m, height = 3.35 m, width 3.1 m

Consideration must also be given to any other types of vehicle requiring access to this area, e.g. lorries for roll-on/roll-off containers.

Wst 04 Speculative finishes

(offices only)

Aim

To encourage the specification and fitting of finishes selected by the building occupant and therefore avoid unnecessary waste of materials.

Overview

Assessment type	Credits available	Minimum standards	Applicable assessment criteria
Part 1: Fabric and structure	0	None	Not applicable
Part 2: Core services	0	None	Not applicable
Part 3: Local services	0	None	Not applicable
Part 4: Interior design	1	None	All

Assessment type specific notes

Ref	Assessment type specific note
-	None

Building type specific notes

Ref	Building type specific note
-	None

Assessment criteria

One credit – Speculative finishes

1 For tenanted office areas (where the future occupant is not known), prior to full fit-out works, carpets, other floor finishes and ceiling finishes have been installed in a show area only.

2 Only install floor and ceiling finishes selected by the known occupant of a development. Alternatively, where the occupant is not known and only ceiling finishes and no carpets are installed, the building owner confirms that the first tenants will not be permitted to make substantial alterations to the ceiling finishes.

Methodology

None.

Compliance notes

Ref	Terms	Description
CN1	Designed-out or integrated finishes	The requirements for this credit are met when either: — No finishes within the scope of the issue have been specified, or — Finishes are integrated into the asset and designed in a way that the finish cannot be removed.

Ref	Terms	Description
		For instance, a self-finished timber floor or exposed soffit which cannot be removed and does not require additional finishes when installed.

Evidence

Criteria	Interim design stage	Final post-construction stage
1	Design drawings, finishes schedules relevant sections of the building specifications or contract clauses or letter from the client or developer to confirm that either no finishes will be installed, or these will be limited to a show area only.	Final construction drawings or equivalent and assessor site inspection report with photographic evidence to confirm that either no finishes will be installed, or these will be limited to a show area only.
2	Design drawings, finishes schedules or relevant sections of the building specifications confirming specified finishes and evidence to demonstrate these have been selected by the occupant. OR Letter of commitment from the client or project team to confirm that floor and ceiling finishes will be selected by the known occupant. Where occupant is not known and ceilings are installed, contract clauses or letter from the client or developer to confirm that the tenant will not be able to make substantial alterations to the ceiling.	Final construction drawings or equivalent or finishes schedules confirming the floor and ceiling finishes and that these have been selected by the occupant. Assessor site inspection report with photographic evidence to verify that the ceiling and floor finishes have been installed in line with the occupant's selection. Where occupant is not known and ceilings are installed, tenancy agreement confirming that the tenant is not allowed to make substantial alterations to the ceiling.

Definitions

Show area – Office buildings

A show area can be either a floor plate or an individual office but must be less than 25% of the net lettable floor area to award the credit.

Speculative finishes

A standard, move in ready level of interior fit-out that a developer applies before a tenant is secured to make the space immediately leasable while remaining generic enough to suit a wide range of future occupants and adaptable at a later date.

Speculative project

A building designed and built by a developer without a pre-existing tenant or buyer in mind. The primary purpose is to anticipate and meet future market demand, with a flexible design, focus on value and common features that would appeal to a broad range of buyers or tenants.

Substantial alterations

Substantial alterations refer to any changes to the ceiling finishes that significantly impact their original appearance, structural integrity, or functional characteristics. This includes, but is not limited to, the removal, replacement, or significant modification of the materials or design.

Routine maintenance, minor touch-ups, and aesthetic adjustments that do not alter the primary function or structural properties of the ceiling finish are not considered substantial.

Additional information

None.

Wst 06 Disassembly and adaptability

(all buildings)

Aim

To minimize costs and use of materials due to future adaptations and to promote circular economy principles.

Overview

Assessment type	Credits available	Minimum standards	Applicable assessment criteria
Part 1: Fabric and structure	2	None	All
Part 2: Core services	2	None	All
Part 3: Local services	2	None	All
Part 4: Interior design	2	None	All
EU Taxonomy	-	-	1–5

Assessment type specific notes

Ref	Assessment type specific note
-	None

Building type specific notes

Ref	Building type specific note
-	None

Assessment criteria

One credit – Design for disassembly and adaptability – Recommendations

1 By the end of Concept Design, conduct a study to explore the disassembly and adaptation potential of different design scenarios (see M1).

2 By the end of Concept Design, develop solutions based on the study (criterion 1) that allow disassembly and adaptability (see M1).

One credit – Design for disassembly and adaptability – Implementation

3 Achieve criteria 1 and 2.

4 During Technical Design, provide an update on the following (see M2):

4.a How the solutions proposed by Concept Design have been implemented where practical and cost effective. Omissions must be clearly justified.

4.b Changes to the recommendations and solutions during the development of the Technical Design.

5 Produce a building design for disassembly and adaptability manual (see Definitions and M2) to communicate the disassembly and adaptability principles and characteristics to prospective owners or building operators.

Methodology

M1: Design for disassembly and adaptability study

M1.1: Adaptability principles

The study and solutions must consider the following as a minimum:

1. **Versatility**: the ability of spaces to accommodate changes in use with minimal changes to maximise space utilisation. For example, a performance space that can also be used as a meeting or community space.
2. **Convertibility**: related to versatility, the potential of internal spaces to accommodate more significant changes in use without affecting building structure. For example, changing a cellular office to an open plan office through changing the internal layout and partitions.
3. **Expandability**: the ability of a design to accommodate a substantial change that supports or facilitates the addition of new space, features, capabilities, and capacities. It involves designing to allow for either vertical or horizontal additions in floor space.

For additional guidance, see Table 97 on page 384 and ISO 20887.

M1.2: Disassembly principles

The study and solutions must consider the following as a minimum:

1. **Ease of access to components and services**: it allows for a material, component, or connector of an assembly, especially those with the shortest anticipated life cycle, to be easily approached, with minimal damage to and impact on it and adjacent assemblies.
2. **Independence**: it allows for parts, components, modules, and systems to be removed or upgraded without affecting the performance of connected or adjacent systems.
3. **Avoidance of unnecessary treatments and finishes**: choice of finishes can limit the options for reusing or recycling, particularly if potentially hazardous substances are included. To support disassembly, finishes that can prevent components from being re-used or recycled should be avoided.
4. **Supporting re-use (circular economy) business models**: this principle is concerned with supporting the market for re-used, refurbished, remanufactured, and recycled materials and products now and in the future, in support of circular economy business models.
5. **Simplicity**: it refers to the quality of an assembly or system that is designed to be straightforward, easy to understand, and meet performance requirements with the least amount of customization.
6. **Standardization**: it is concerned with the use of common components, products, or processes to satisfy a multitude of requirements.
7. **Safety of disassembly**: it is concerned with easy access to accurate information on the original materials and assembly methods used for an asset, together with details of any subsequent major renovation.

For additional information, see Table 98 on page 384 and ISO 20887.

M2: Implementing design for disassembly and adaptability

The implementation will be specific to the building and scope of the project, but information should be made available to the assessor covering the implementation of all adaptability and disassembly principles as per M1.

A disassembly and adaptability manual shall be prepared and submitted, including the following information:

1. Design details: Sufficient information shall be generated documenting specific disassembly methods, material composition, recovery methods, and adaptable design features.
2. Material constituents and manufacturers: Products and materials should be traceable to a specific manufacturer or supplier, with contact details, such as product manufacturer websites, included in the construction documentation.

3. Connection detailing: Connection detailing, especially for reversible connections, should be well documented for the aspect of assembly and disassembly.

For additional information, see ISO 20887.

Compliance notes

Ref	Terms	Description
CN1	Design for disassembly and adaptability – timing	Late consideration of design for disassembly and adaptability, might reduce the study to a 'paper exercise', with minimal value to the project. However, where the assessor is satisfied that there is clear justification for the study being developed at a slightly later stage AND there is clear evidence that the strategy has achieved the intended outcomes despite the later consideration, this will be sufficient for compliance. In any case, all other requirements of the issue must be met for the credit to be awarded.

Evidence

Criteria	Interim design stage	Final post-construction stage
1–2	A copy of the disassembly and adaptability study completed at Concept Design.	No further actions required post-construction. No additional evidence is required other than that listed for the design stage.
4	A copy of the design for disassembly and adaptability implementation plan report completed at Technical Design.	Final construction drawings or equivalent and assessor site inspection report with photographic evidence showing that the recommendations and solutions were implemented within the build.
5	Relevant section of the building specification, contract clauses or letter of commitment to produce a building design for disassembly and adaptability manual.	A copy of the building design for disassembly and adaptability manual.

BRE has avoided being overly prescriptive for this issue, recognising that this is a complex environmental and design issue where solutions and approaches are largely influenced by building specific factors. The evidence required to demonstrate compliance will vary according to the relevant stage. Some examples are:

- Concept Design: reports outlining the activity relating to functional adaptability and disassembly - ideas discussed, analysis and decisions taken.
- Concept and Developed Design stages: drawings or building information model (BIM).
- All stages: meeting notes, construction programme, responsibilities schedule (indicating parties consulted).

BREEAM Assessors should use their judgement to determine whether the aim and intent of each credit has been met (using appropriate project information to support the decision).

Definitions

Adaptability

Ability to be changed or modified to make suitable for a particular purpose.

Building disassembly and adaptability manual

The manual can be in the form of an analogue document, or an Asset Information Model from the Building Information Model (BIM). For information on what the guide could include, see ISO 20887.

Disassembly

Non-destructive taking-apart of a construction works or constructed asset into constituent materials or components.

Additional information

Example design measures for adaptability

Examples of adaptability design measures that may be adopted for each assessment part when considering versatility, convertibility, and expandability are provided in Table 97 below.

Table 97: Examples of design measures allowing adaptability

Principles for adaptability	Examples of design measures and aspects to consider for specific building elements		
	Fabric and structure	Core and local services	Interior design
Versatility	A gymnasium can double as a community theatre or arts centre if it is provided with portable seating.	A pipeline that can batch various products or processes.	A dividing partition can also function as a conduit for utilities.
Convertibility	Location of structural components within the floor space.	-	Layout in standardised grids. Use of inherent finishes to allow replacement. Use of standardised material sizes.
Expandability	Provision to add extensions or alterations to increase building capacity.	Provision of capacity in infrastructure to enable future expansion and adaptation.	Identifying or recognising potential future functional requirements. Efficient use of space to allow for any increase in occupancy.

Example design measures for disassembly

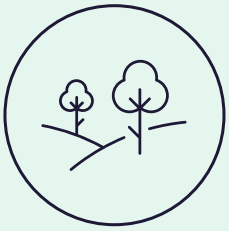
Examples of considerations when designing for disassembly are provided in Table 98 below.

Table 98: Examples of design measures and aspects to consider regarding future disassembly

Principles for disassembly	Examples of design measures and aspects to consider
Ease of access to components and services	Exposed and reversible connections facilitate disassembly. Consider space availability between building elements when aiming to accommodate disassembly. Poured and welded connections are likely to harm components and prevent disassembly.
Independence	Layers standing independently, especially when components have different lifespans. The following principal layers can be identified as follows: — Structure: foundation and load-bearing elements — Skin: exterior surfaces — Services — Space plan: the interior layout — Stuff: furnishings and carpets
Supporting re-use (circular economy) business models	Consideration shall be given to the re-use potential of materials, products, components, and systems. A consideration of the service life in the re-used application compared to the residual service life of the product or material in the original application shall be factored into this approach. Materials should be selected for which it can be anticipated that a market will exist for their re-use in the future, and for which facilities exist for any required handling or processing. The use of construction components that can be refurbished, allowing for an increase in their service life, shall be considered.

Principles for disassembly	Examples of design measures and aspects to consider
Standardisation	Standard-size materials can accommodate multiple uses, reuse and upgrading. Standard types of connections can be separated and reused more easily. Modularity allows elements to be slotted together or taken apart to promote disassembly and flexible environments.

Land use and ecology



Summary

This category encourages a best practice approach to creating the best outcomes for nature including the protection and creation of habitats, reducing the risk of bird-window collision and improvement of long-term biodiversity. Issues in this section relate to assessing ecological risks and opportunities for the building and site, the protection and enhancement of ecological value, and long-term management of biodiversity.

Assessment issues

Lue 01 Site selection	-
Lue 02 Ecological risks and opportunities	up to 2 credits + 1 exemplary
Lue 03 Managing impacts on ecology	up to 3 credits
Lue 04a Ecological change and enhancement	up to 4 credits + 1 exemplary
Lue 04b Ecological change and enhancement	up to 4 credits + 1 exemplary
Lue 05 Long term ecological management	up to 2 credits

Lue 01 Site selection

(not applicable)

This issue is not assessed in BREEAM Refurbishment and Fit Out V7.

Lue 02 Ecological risks and opportunities

(all buildings)

Aim

To determine the existing ecological value associated with the site, including surrounding areas, and the risks and opportunities for ecological protection and enhancement as part of the project.

Overview

Assessment type	Credits available	Minimum standards	Applicable assessment criteria
Part 1: Fabric and structure	2 + 1 exemplary	None	See ref 1.0, 1.1, and 1.2
Part 2: Core services	up to 2 + 1 exemplary	None	Scope dependent (see ref 1.1)
Part 3: Local services	up to 2 + 1 exemplary	None	Scope dependent (see ref 1.1)
Part 4: Interior design	up to 2 + 1 exemplary	None	Scope dependent (see ref 1.1)
EU Taxonomy	-	-	1–6 (see M4)

Assessment type specific notes

Ref	Assessment type specific note
1.0	**New build extensions** This issue is applicable for Part 1 assessments where a new build extension is included in the scope of the project. Full criteria should be followed.
1.1	**External works included in scope** This issue is applicable for Part 1 assessments where external areas are included in the scope of the project. For Part 2, 3, or 4 assessments, this issue is only applicable where external works are included in the scope of the project. Full criteria should be followed.
1.2	**Part 1 assessments with no external works or extension** An ecological survey should be undertaken of the building itself focusing on the roof, loft space, and façade. If the ecologist finds evidence of wildlife or opportunities to enhance ecological value, then all criteria apply in this issue but the level of detail required should be reflective of the situation and determined by the SQE.

Building type specific notes

Ref	Building type specific note
-	None

Assessment criteria

One credit – Survey and evaluation

1 A suitably qualified ecologist (SQE) carries out a survey and evaluation (see M1) for the site early enough to influence site preparation works (where relevant) and strategic planning decisions.

2 The SQE's survey and evaluation determines the site's ecological baseline, including:

2.a Current and potential ecological value and condition of the building itself, the site (where applicable), and related areas within the zone of influence.

2.b Direct and indirect risks to current ecological value from the project.

2.c Capacity and feasibility for enhancement of the site's ecological value and, where relevant, areas within the zone of influence.

2.d Sites located in or near biodiversity sensitive areas (see M4.2).

One credit – Determining ecological outcomes

3 Achieve criteria 1 and 2.

4 The ecologist collaborates with appropriate project team members (e.g. landscape architect, architect etc.), sharing relevant information and recommendations from the survey and evaluation to influence the project design as well as decisions regarding site preparation and construction works.

5 The ecologist, with full support from the project team, collaborates with representative stakeholders (see M2.1) early enough to influence key planning decisions.

6 The ecologist identifies the optimal ecological outcomes for the project, and identifies measures to achieve these outcomes in line with:

6.a The collaborations undertaken as part of criteria 4 and 5.

6.b The mitigation hierarchy:

6.b.i Avoidance

6.b.ii Protection

6.b.iii Reduction or limitation of negative impacts

6.b.iv On-site compensation

6.b.v Enhancement, considering the capacity and feasibility within the site, or where this is not viable, off-site.

One exemplary credit – Wider site sustainability

7 Achieve criteria 3 to 6.

8 When determining the optimal ecological outcome for the project consider the wider site sustainability-related activities and the potential for ecosystem service-related benefits. For a list of the minimum areas for consideration, see M3.

9 Incorporate at least one measure into the design that would demonstrate an ecosystem service related benefit.

Methodology

M1: Survey and evaluation

M1.1: Surveying techniques

In addition to a visual inspection, the SQE may apply a range of surveying techniques that are acceptable for the purposes of BREEAM based on their professional opinion. These include:

- Bioacoustics
- Digital surveying
- eDNA
- Field sampling techniques

M1.2: Timing of ecological survey

For criterion 1, the SQE can use their discretion to confirm if their survey is early enough to understand the ecological features that are present before works commence and in time to influence site clearance, preparation and layout where applicable.

M1.3: Scope and scale of project

For criterion 2, the survey and evaluation approach used should be appropriate to the scope and scale of the project, as determined by the ecologist.

M2: Determining ecological outcomes

M2.1: Representative stakeholders

For criterion 5, where deemed necessary by the ecologist (where appointed), the ecologist and/or a member of the project team should consult with representative stakeholders to determine appropriate options for the site in question. This may include:

- Local government and other statutory relevant organisations.
- Local community groups or organisations or charities.
- Local, regional and or national fauna focused groups.

The nature of this consultation will vary depending on the project's type and scale and the sensitivity of the site. This should be guided by the ecologist where appointed.

M2.2: Determining ecological outcomes, and identifying and agreeing measures

For criterion 6, appropriate actions for the site need to optimise ecological outcomes in terms of the considerations in Table 99 below:

Table 99: Considerations for optimising ecological outcomes

Considerations for the project team to optimise ecological outcomes	Applicable considerations for stakeholder consultation	Example
Ecological benefit offered (pre, during and post project completion, as appropriate). This includes: 1. Contribution of the site to local biodiversity goals taking into consideration quality, connectivity, and fragmentation of local habitats. 2. Opportunities to enhance the value of existing habitats and biodiversity in the vicinity, including the building itself, or to restore or add new features of ecological value to local biodiversity.	Yes	1. The site can contribute to local biodiversity goals by facilitating for and preserving high distinctiveness habitat types in and around the site, such as lowland meadows. 2. Existing habitats can be enhanced by introducing features such as bird boxes and bat nests to the site
Wider community and end user involvement benefits	Yes	This could include aspects such as recreational green spaces and nature-based solutions.
Protecting flora and fauna during refurbishment, site-preparation, and landscaping works where applicable.	No	This could include measures to prevents different forms of pollution from the site, such as noise pollution, from impacting the surrounding area.
Timing and duration of implementing and realising the outcome.	Yes	-
Long term management and maintenance implications, and costs.	Yes	-
Opportunities and barriers arising from management structures and procurement processes.	No	-
Availability of appropriate skills, budgets and other resources at all stages.	No	-

M2.3: Collaboration to determine ecological outcomes

For criteria 4, 5, and 6 collaboration needs to happen early in the project to determine ecological outcomes and continue throughout the project whenever key decisions are being made that could impact ecological outcomes. Where appointed, evidence must include a confirmation from the ecologist that they were allowed to undertake all collaborations with project team members and stakeholders that they deemed necessary to fulfil the project's optimal ecological outcomes.

M3: Wider site sustainability

For criterion 8, the following opportunities for integrating ecology with wider site sustainability-related activities and ecosystem services should be considered as a minimum dependent on scope of refurbishment works:

1. Landscape
    a. Landscape design
    b. Heritage and local character
    c. Green infrastructure
2. Health and wellbeing
    a. Recreational space (including growing space, community agriculture or horticultural and allotment activities)
    b. Water quality measures
    c. Noise mitigation measures
    d. Air quality control measures
    e. Light pollution control measures
3. Resilience
    a. Climate change mitigation
    b. Management of surface water run-off
    c. Flood risk management
    d. Climate-sensitive urban design (heat island effect, thermal mass, shading, biotic cooling etc.)
4. Infrastructure
    a. Maximising the benefits of green infrastructure and optimising alignment with existing infrastructure on the site and the zone of influence.
5. Community and end user involvement

M4: EU Taxonomy

M4.1: Environmental impact assessment

An environmental impact assessment (EIA) or screening has been completed in accordance with Directive 2011/92/EU.

Where an EIA has been carried out, the required mitigation and compensation measures for protecting the environment are implemented.

It is not a requirement to do an EIA but where undertaken it could help meet requirements for criterion 2 and criteria 4 to 6.

The focus of this assessment issue is on carrying out the EIA and selecting appropriate mitigation and compensation measures. The implementation of these measures is undertaken in following assessment issues.

M4.2: Biodiversity-sensitive areas

For sites/operations located in or near biodiversity-sensitive areas (including the Natura 2000 network of protected areas, UNESCO World Heritage sites and Key Biodiversity Areas, as well as other protected areas), an appropriate assessment, where applicable, has been conducted and based on its conclusions the necessary mitigation measures are implemented.

The focus of this assessment issue is on carrying out the EIA and selecting appropriate mitigation and compensation measures. The implementation of these measures is undertaken in following assessment issues.

Compliance notes

Ref	Terms	Description
CN1	Timing of ecological survey or report	If the ecologist's site survey or report is completed at a later stage than required, the ecologist needs to be satisfied that it was produced early enough for the recommendations to influence key planning decisions and leads to a positive outcome

Ref	Terms	Description
		in terms of protection and enhancement of site ecology.
CN2	Verifying ecology reports or information	If the appointed ecologist does not meet the definition of a suitably qualified ecologist (SQE), the report or information submitted to support the assessment must be verified by an individual who does. 1. The individual verifying the report must provide written confirmation that they comply with the definition of a suitably qualified ecologist. 2. The verifier must provide signed confirmation that they have checked and approved the report. This must clearly reference the report and can be in the form of a signed letter or their printed name and signature on a completed pro-forma. In doing so, they are deemed to confirm that the report: a. Represents sound industry practice. b. Is correct, truthful, and objective. c. Is appropriate given the local site conditions and scope of works proposed. d. Avoids invalid, biased, or exaggerated statements. Such confirmation from the verifier must be provided in addition to all other information required by the relevant technical manual and referenced as part of the evidence submitted to demonstrate compliance.
CN3	Vertical new build extensions	For projects where the extension is vertical, this issue will be filtered in if there is scope to minimise impacts on wildlife (i.e. bats roosting in the roof) and/or to incorporate measures that will enhance ecology, such as green roofs or walls. This assessment issue is always applicable to horizontal new build extensions.
CN4	Survey finds no evidence of wildlife or opportunity to enhance ecology	For Part 1 assessments without external areas in scope, where the ecologist finds no evidence of wildlife or no opportunities to enhance site ecology, credits relating to determining ecological outcomes will be filtered out. The rest of the land use and ecology criteria will also be filtered out, except for the criteria relating to bird-window collisions where this applies. The credit relating to survey and evaluation should be awarded where the appropriate requirements are met.

Evidence

Criteria	Interim design stage	Final post-construction stage
Survey and evaluation		
1–2	A copy of the ecological survey and evaluation that meets the requirements as detailed in this issue.	No further actions required post-construction; no additional evidence is required other than that listed for the design stage.
Determining ecological outcomes		
4–6	Statement from the ecologist confirming that they collaborated with all project team members and stakeholders they deemed necessary to identify and deliver the project's optimal ecological outcomes and measures to achieve them.	No further actions required post-construction; no additional evidence is required other than that listed for the design stage.
6	A report or statement confirming the optimal ecological outcomes identified for the project, as well as the measures being implemented to achieve these outcomes (in accordance with the mitigation hierarchy).	No further actions required post-construction; no additional evidence is required other than that listed for the design stage.
Wider site sustainability		
8, 9	A report or statement confirming which ecosystem service-related benefits were considered, as well as the measure/s being incorporated into the design. This should be part of the optimal ecological outcomes document.	Evidence confirming ecosystem service benefit has been implemented into the as-built project.

Criteria	Interim design stage	Final post-construction stage
EU Taxonomy		
M4	Copy of the environmental impact assessment (EIA).	No further actions required post-construction; no additional evidence is required other than that listed for the design stage.

Definitions

Bioacoustics

Bioacoustics is the surveying of biological sources of sound, using equipment such as microphones and hydrophones. Analysis of these sounds can have a wide range of applications, such as identifying different species and population dynamics, as well as long term, relatively cheap and low maintenance monitoring of a site. Bioacoustics can also be used to assess the impacts of noise pollution on animal vocalisations. Combining bioacoustics with other methods of surveillance allows for a more comprehensive approach.

Compensation

Measures taken to make up for the loss of, or permanent damage to, ecological features despite mitigation, e.g. replacement habitat or improvements to existing habitats similar in terms of biological features and ecological functions to that lost or damaged. Compensation can be provided either within or outside the project site, in line with the following hierarchy: within site, adjacent to site and off site (offsetting) as a last resort.

Connectivity

The degree to which the configuration of habitats facilitates movement of species between and across resource patches.

Digital surveying

Digital surveys in ecology use technology like drones, AI, satellite imagery, and apps to collect, analyse, and manage ecological data more efficiently than traditional methods. These digital tools speed up processes like habitat mapping and species monitoring, improve data accuracy, and allow for real-time analysis and reporting for projects like development impact assessments and biodiversity net gain monitoring.

Ecological baseline

The ecological baseline conditions are those which exist in the absence of proposed activities. It is used to compare performance after construction, to determine if it is the same or significantly changed.

Ecological value

The importance, worth, or usefulness of a species, habitat or ecosystem in terms of its impact on other species and habitats, as well as the other environmental, social, cultural and economic value that can be delivered from species and habitats and their interactions (ecosystem services) specific to a geographical frame of reference.

Ecosystem services

Ecosystem services are the benefits people obtain from ecosystems. These include provisioning services such as food and water; regulating services such as regulation of floods, drought, land degradation, and disease; supporting services such as soil formation and nutrient cycling; economic value such as tourism, and cultural and social services such as health and wellbeing, recreational, spiritual, religious and other non-material benefits.

eDNA

Abbreviated as eDNA, environmental DNA refers to genetic material left behind in the environment by species. This genetic material can be extracted and sampled to identify the species that have shed the material.

Enhancement

Improved management of ecological features or provision of new ecological features, resulting in a net benefit to biodiversity, which is unrelated to a negative impact or is 'over and above' that required to mitigate or compensate for an impact.

External works

All items outside the building footprint but inside the site boundary, encompassing wastewater and surface water drains, supply of utilities (e.g. gas, electricity and cabled services), footpaths, and access for vehicles including car parks, and hard and soft landscaping.

Field sampling techniques

Field sampling techniques in ecology are techniques for data collection that that involve gathering data at a lower scale than other surveying techniques and are often more focused on individuals or smaller sections of a site. Examples of field sampling techniques include camera traps, line transects, and quadrats. Such techniques are especially usually when conducted repeatedly over a long period of time, as the allow changes in an ecosystems state to be observed.

Green infrastructure

Multi-functional space, urban and rural, that can form a network or be self-contained, which can deliver a wide range of environmental and quality of life benefits for local communities. It covers both 'green' and 'blue' (water environment) features of the natural and built environments. Examples include parks, open spaces, playing fields, woodlands, wetlands, grasslands, river and canal corridors, allotments, private gardens and living (green) roofs and façades.

Mitigation hierarchy

A framework that businesses, developers, and ecologists can follow in their efforts to avoid, minimise, restore, or offset biodiversity loss. The mitigation hierarchy is as follows:

1. Avoidance
2. Protection
3. Reduction or limitation of negative impacts
4. On-site compensation
5. Enhancement, considering the capacity and feasibility within the site, or where this is not viable, off-site

Optimal ecological outcomes

The optimal ecological outcomes for a project comprise high level mission statements, for which individual mitigation and enhancement measures must be identified and implemented to achieve said outcome.

For example, the optimal ecological outcomes might include 'Ensuring the site protects and supports local bird species', and the resulting measures to deliver this could be installing bird boxes / bricks into the project and undertaking nesting bird checks prior to vegetation clearance.

Suitably qualified ecologist (SQE)

An individual achieving all the following items can be 'suitably qualified' for the purposes of compliance with BREEAM:

1. Holds a degree or equivalent qualification in ecology or a related subject comprising a significant ecology component.
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. The relevant experience must relate to the country that the assessment is being carried out in.

Ecology related subject – Depending on the ecological content (minimum 60%), the following degrees might be considered relevant: Ecology, Biological Sciences, Zoology, Botany, Countryside Management, Environmental Sciences, Marine and Freshwater Management, Earth Sciences, Agriculture, Forestry, Geography, Landscape Management.

Zone of influence

The area(s) over which ecological features may be affected by the biophysical changes caused by a proposed project and associated activities. For example, this can include areas of land, flight paths or water bodies that are impacted by the site being assessed. These areas can be adjacent to the site or can be areas that are impacted by the site although not physically linked, including areas downstream. Species and habitats in areas within the zone of influence might be negatively affected by changes on an assessed site but these changes may also provide opportunity to maximise the benefits of enhancement activities within the zone of influence.

Additional information

BREEAM Strategic Ecology Framework

The BREEAM Strategic Ecology Framework was developed to guide the development of ecology related assessment criteria in BREEAM.

The aims of the Strategic Ecology Framework are to:

- Understand the existing ecological value and condition of a site and its associated areas, to identify appropriate objectives.
- Identify, protect, and enhance key existing ecological features.
- Remove or limit as far as possible, existing features identified as having negative impacts on the ecological value of the site.
- Mitigate unavoidable impacts and compensate against residual impacts.
- Enhance the broader ecological value of the site and its links to associated areas through the creation and/or management of ecological features on or near the site.
- Secure ongoing management and maintenance to ensure intended outcomes are realised over the life of the site.

Wider sustainability benefits

For more information and examples of the wider sustainability benefits that can be considered, see the BREEAM Briefing Paper 'Greening the Built Environment'.

Parks are recognised as vital components of urban infrastructure, offering significant environmental and health advantages to residents and neighbourhoods. When utilised effectively, parks and green spaces can play a central role in combating climate change.

The following link provides fact sheets that highlight five innovative approaches through which parks and green spaces can lower carbon emissions and address climate challenges, all while promoting health, equity, and improved quality of life in cities: How Parks Advance Sustainability and Resilience | ULI Knowledge Finder

World Database on Protected Areas

The World Database on Protected Areas (WDPA) contains information from various organisations such as national governments, non-governmental organisations, academic institutions, international biodiversity convention secretariats, etc. The data and maps can be used for environmental impact analysis and private sector decision-making when areas of ecological value could be impacted.

Lue 03 Managing impacts on ecology

(all buildings)

Aim

To avoid, or limit as far as possible, negative ecological impacts on the site and its zone of influence resulting from the project.

Overview

Assessment type	Credits available	Minimum standards	Applicable assessment criteria
Part 1: Fabric and structure	up to 3	None	All (see ref 1.0, 1.1, and 1.2)
Part 2: Core services	up to 2	None	Scope dependent (see ref 1.1)
Part 3: Local services	up to 2	None	Scope dependent (see ref 1.1)
Part 4: Interior design	up to 3	None	Scope dependent (see ref 1.1 and 1.3)
EU Taxonomy	-	-	1–4 (see M3)

Assessment type specific notes

Ref	Assessment type specific note
1.0	**New build extensions** Only applicable where an ecologist or the project team has selected measures to avoid or limit negative impacts on existing ecology (see criterion 6 in Lue 02). AND/OR Where the façade of the development has a glass coverage of 50% or more, the criteria for reducing bird-window collisions apply (criteria 4 and 6).
1.1	**External areas included in scope** The relevant criteria are all applicable. For Part 2, 3, or 4 assessments, this issue is only applicable where external works are included in the scope of the project. This issue is also applicable to Part 1 assessments where external areas are included in the scope of the project.
1.2	**Part 1 assessments** Only applicable where an ecologist has selected measures to avoid or limit negative impacts on existing wildlife (see criterion 6 In Lue 02). AND/OR Where the façade of the development has a glass coverage of 50% or more, the criteria for reducing bird-window collisions apply (criteria 4 and 6).
1.3	**Part 4 assessments** Where the façade of the development has a glass coverage of 50% or more, the criteria for reducing bird-window collisions apply (criteria 4 and 6).

Building type specific notes

Ref	Building type specific note
-	None

Assessment criteria

Two credits – Implementation of measures on-site

1 The project must meet the criteria outlined in Lue 02 for 'Survey and evaluation' and 'Determining ecological outcomes'.

2 The design and refurbishment teams must structure and conduct the handover in a thorough manner, to ensure that all planned ecological measures are communicated, understood, and followed throughout the refurbishment.

3 The refurbishment processes must integrate the measures required to achieve optimal ecological outcomes. The project team must measure and monitor these measures throughout the refurbishment and handover phases as follows:

3.a The contractor must nominate a biodiversity champion with authority to influence site activities and to ensure the necessary measures are implemented.

OR

3.b When the contractor is advised to appoint a suitably qualified ecologist (SQE) during the refurbishment works (an Ecological Clerk of Works), the contractor must do so.

3.c If the SQE needs an additional ecological specialist (for example, an expert on a particular form of wildlife), the contractor must provide for such services as required.

One credit – Bird-window collision risk audit and mitigation measures

4 Where glazing represents more than 50% of the total façade area within the scope of the refurbishment, a suitably qualified ecologist (SQE) must undertake an audit to determine whether the development is at risk of bird-window collisions.

5 If the SQE assesses that the development poses no risk of bird-window collisions, one credit can be awarded.

OR

6 If the audit confirms that there is a risk of bird-window collisions, the project team must implement the mitigation measures recommended by the SQE (see M1.3).

Methodology

M1: Bird collisions

M1.1: SQE audit

In order to ensure that the bird collision mitigation measures are proportional to the risk, the SQE conducting the audit should determine which sections of the glazing require mitigation measures.

M1.2: Glazing measurement

In order to determine whether glazing represents more than 50% of the total façade area, the surface area of the glazing (m^2) must be divided by the total façade area, in m^2. When calculating the surface area of the glazing, frames should not be included, only the glass.

M1.3: Mitigation measures

Birds collide with windows because they see reflections of vegetation or sky, or they see through the glass to plants on the other side. They cannot see the glass itself and therefore fly into it.

At night, artificial light from buildings, towns and cities endangers birds as the bright light confuses them and pulls them off route, as they use the light from the moon, stars and setting sun to navigate. Mitigation to address this aspect is covered in Pol 04 Reduction of nighttime light pollution.

Colliding with the building usually results in death on impact, but otherwise they may fall to the ground and be vulnerable to predators or later die of serious injuries.

Bird collisions can be significantly reduced by applying mitigation measures to the glazing, examples of which are listed below. These mitigation measures are only applicable to works within the scope of the refurbishment.

— **Use of bird-friendly glazing**: Bird-friendly glazing refers to glass designed to prevent bird collisions by making glass surfaces more visible to birds. This is typically achieved through patterns on the glass, either etched, coated, or applied as films.

— **External visual markers**: Another way of preventing collisions is to apply patterns that are correctly sized and spaced on the outside of glazing. As a guide, you should be able to see the pattern from three metres away as this gives the bird

time to detect the window, change course and avoid a collision. Larger patterns are more effective as they are easier for birds to see. Markers should be less than 5 cm apart for vertical, horizontal and diagonal spacing.

Mitigation measures will likely be dependent on the RFO parts that are within scope.

M2: Collating evidence

Guidance Note 41 *Ecology Assessment Reporting Template* (GN41) can be used to collate information and evidence for the assessment. Alternative evidence is acceptable if it demonstrates the criteria have been achieved. Any alternative reporting format must highlight clearly how all the items in GN41 have been addressed.

Please note that GN41 is a summary document and additional supporting evidence will also be required.

M3: EU Taxonomy

M3.1: EIA

An Environmental Impact Assessment (EIA) or screening has been completed in accordance with Directive 2011/92/EU.

Where an EIA has been carried out, the required mitigation and compensation measures for protecting the environment are implemented.

It is not a requirement to do an EIA but where undertaken it will help meet requirements for criteria 1 to 3.

For this issue, the focus is on the implementation of mitigation and compensation measures identified in assessment.

M3.2: Biodiversity-sensitive areas

For sites/operations located in or near biodiversity-sensitive areas (including the Natura 2000 network of protected areas, UNESCO World Heritage sites and Key Biodiversity Areas, as well as other protected areas), an appropriate assessment, where applicable, has been conducted and based on its conclusions the necessary mitigation measures are implemented. For this issue, the focus is on the implementation of mitigation measures identified in the assessment.

Compliance notes

None.

Evidence

Criteria	Interim design stage	Final post-construction stage
Implementation of measures on-site		
2	Evidence that information about the planned ecological measures has been appropriately handed over from the design team to the refurbishment team (e.g. Design documents outlining plans for the ecological measures to be implemented on site). If there has been a change in ecologist, the incoming ecologist must confirm they were provided with all the information they needed to understand the optimal ecological requirements and implement the measures to achieve them.	No additional evidence is required post construction.
3	A statement from the SQE or biodiversity champion covering: — All measures to be implemented to achieve optimal ecological outcomes. — How each measure should be implemented on site by the contractor. — The management and monitoring	Evidence in accordance with the statement provided at design stage, for example, site records, site procedures, environmental plans, toolbox talks, site programmes, drawings, site photographs and/ or sign off by the ecologist. If there have been any changes to the measures used, evidence gathered, or to

Criteria	Interim design stage	Final post-construction stage
	actions (if any). The statement must also provide the name of the contractor's appointed biodiversity champion, and their position on site to demonstrate they have appropriate authority to undertake this role.	management and monitoring practices, the ecologist must provide a statement explaining that the project still achieved its optimal ecological outcomes.
Reducing bird-window collisions		
4, 5	Documentation of the audit carried out by the SQE, confirming whether the refurbishment works pose a risk of bird-window collisions.	No additional evidence is required post construction.
6	Specification documents demonstrating which measures have been implemented into the refurbishment works.	Photographs can be used to evidence the implementation of mitigation measures for the glass.
EU Taxonomy		
M3	Copy of the environmental impact assessment (EIA).	No further actions required post-construction; no additional evidence is required other than that listed for the design stage.

Definitions

Biodiversity champion

An individual in a position of authority who is formally tasked by the principal contractor with monitoring and influencing site activities to minimise detrimental impacts on biodiversity. The biodiversity champion need not be an ecologist or ecological expert but must have sufficient knowledge of ecology and construction to carry out the role and must be on site frequently enough to monitor construction activities. The biodiversity champion may be the same person as the sustainability champion in Man 03 Responsible construction.

Ecological Clerk of Works (UK & Ireland only)

An environmental professional tasked with supervising a construction site to ensure environmental regulations and policies are complied with. This includes responsibilities such as identifying high-value biodiversity features, managing other ecological operatives, and ensuring that environmental protection measures do not incur significant delays or financial costs to the project, whenever possible. An Ecological Clerk of Works must be accredited, primarily by the professional membership body the Chartered Institute of Ecology and Environmental Management.

External works

All items outside the building footprint but inside the site boundary, encompassing wastewater and surface water drains, supply of utilities (e.g. gas, electricity and cabled services), footpaths, and access for vehicles including car parks, and hard and soft landscaping.

Handover

For the purposes of this issue, handover is when responsibility for the ecology of the site is passed from one individual or organisation to another. An effective handover is critical to meeting the ecological objectives. The handover process encompasses all and any information, activity and responsibility that is relevant to achieving those objectives, including communication, monitoring, and reporting.

Suitably qualified ecologist (SQE)

An individual achieving all the following items can be 'suitably qualified' for the purposes of compliance with BREEAM:

1. Holds a degree or equivalent qualification in ecology or a related subject comprising a significant ecology component.
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. The relevant experience must relate to the country that the assessment is being carried out in.

Ecology related subject – Depending on the ecological content (minimum 60%), the following degrees might be considered relevant: Ecology, Biological Sciences, Zoology, Botany, Countryside Management, Environmental Sciences, Marine and Freshwater Management, Earth Sciences, Agriculture, Forestry, Geography, Landscape Management.

Additional information

Bird-window collision

A bird-window collision is when a bird flies into a glass window or otherwise transparent or reflective surface. This can often result in death or severe injury and is particularly common during migratory seasons. The predominant causes of bird-window collisions are the bird's inability to see the glass surface, artificial lights, and habitats being reflected in the glass.

Lue 04a Ecological change and enhancement

(all buildings, all countries except UK)

For buildings in the UK, see Lue 04b Ecological change and enhancement.

Aim

To enhance ecological value of the area associated with the site in support of local, regional, and national priorities.

Overview

Assessment type	Credits available	Minimum standards	Applicable assessment criteria
Part 1: Fabric and structure	up to 4 + 1 exemplary	None	All (see ref 1.0 and 1.2)
Part 2: Core services	up to 4 + 1 exemplary	None	Scope dependent (see ref 1.1)
Part 3: Local services	up to 4 + 1 exemplary	None	Scope dependent (see ref 1.1)
Part 4: Interior design	up to 4 + 1 exemplary	None	Scope dependent (see ref 1.1)
EU Taxonomy	-	-	All (see M5)

Assessment type specific notes

Ref	Assessment type specific note
1.0	**New build extensions** For Part 2, 3, or 4 assessments, this issue is only applicable where new build extensions or external works are included in the scope of the project.
1.1	**External works included in scope** For Part 2, 3, or 4 assessments, this issue is only applicable where new build extensions or external works are included in the scope of the project.
1.2	**Part 1 assessments** Where an ecologist has made recommendations for measures of enhancement in Lue 02, only the ecological enhancement criteria are applicable. Where new build extensions or external works are included in the scope of the project, all criteria apply.

Building type specific notes

Ref	Building type specific note
-	None

Assessment criteria

Prerequisite – Managing negative impacts on ecology

1 Achieve criteria 2 and 3 in Lue 03, where measures were identified for managing impacts on ecology in Lue 02.

One credit – Ecological enhancement

2 Measures have been implemented that enhance ecological value, which are based on input from the project team and SQE in collaboration with representative stakeholders and data collated as part of 'One credit – Determining ecological outcomes' in Lue 02.

3 Data collated are analysed and where potentially valuable, provided to the local environmental records centre nearest to, or relevant for, the site.

Up to three credits (plus one exemplary credit) – Quantifying change in ecological value

4 Up to three credits are awarded based on the percentage biodiversity net gain achieved from the project based on the scale in Table 100 below. In addition, to achieve any credits there must be no residual effects on protected sites or irreplaceable habitats. This should be calculated using one of the following:

4.a Country specific biodiversity metric (see CN1), and where not available,

4.b Global Biodiversity Metric (Ramboll),

4.c European Biodiversity Metric (Ramboll).

Table 100: Credits awarded based on output from the Biodiversity Metric

Description	Output from the Biodiversity Metric	Credits awarded	Additional requirements
No net loss	≥ 0%	1	The total area of habitat created or enhanced should cover at least 2.5% of the site area.
Net gain	≥ 5%	2	The total area of habitat created or enhanced should cover at least 5% of the site area.
	≥ 10%	3	
Significant net gain	≥ 20%	3 + 1 exemplary	The total area of habitat created or enhanced should cover at least 10% of the site area.

OR

One credit – Urban Greening Factor

5 For urban sites, where an ecologist confirms that biodiversity net gain is not appropriate for the project, the Urban Greening Factor may be used as an alternative. A credit is awarded based on meeting the highest applicable target for the asset set out in Table 101.

6 In addition, the SQE must also confirm that the vegetation specified to meet the targets provides ecological benefits. These can be the same measures as outlined in criterion 2, and must be based on input from the project team and SQE in collaboration with representative stakeholders and data collated as part of 'One credit – Determining ecological outcomes' in Lue 02.

7 Where the baseline of the site already meets the target level, or a UGF has been set by a local authority, projects must increase the score by 0.1.

Table 101: Urban Greening Factor – Targets based on asset type

Asset type	UGF
Residential (including residential institutions), daycare centre	0.6
Offices, retail, industrial, hospitality, culture & entertainment, sports & leisure	0.3
Community, education, healthcare, government services, transport hub	0.4
If target is set by local authority	Target set + 0.1 OR BREEAM target (whichever is higher)

Methodology

M1: Ecological enhancement and quantifying change in ecological value

For criterion 2, the ecologist's report must clearly justify how the selected measures meaningfully enhance ecological value.

This criterion recognises enhancement measures that have been carried out in line with good practice recommended by an SQE, which build on mitigation measures taken in Lue 03. This also supports meeting good practice principles of biodiversity net-gain (CIRIA, CIEEM, IEMA)[79] before quantifying the change in ecological value in criterion 4.

The following list provides examples of measures that could be considered by the SQE:

1. Recommendations from biodiversity action plans and/or local nature recovery strategies.
2. Planting that supports at risk species identified in the IUCN Red List, with species selected for their ecological contributions and adaptability to local conditions.
3. Planting appropriate species with a known attraction or benefit to local wildlife or to boost viability of local plant populations.
4. Adopting horticultural good practice in landscape construction, management, and maintenance (e.g. no or low use of residual pesticides and herbicides).
5. Installing features to encourage existing local wildlife (such as nesting, roosting and insect boxes) at appropriate locations on the site and in line with relevant guidance.
6. Increasing the porosity and texture of surfaces on site to encourage wildlife (e.g. improving the texture of the soil and making it more porous will encourage more plants to grow).
7. Introducing surface water features into the environment to encourage birds and other wildlife (e.g. wildlife ponds, wetland areas).
8. Improvement of soil health and fertility.

M1.1: Collaboration throughout the project

For criterion 2, feedback from relevant stakeholders in Lue 02 informs decisions made in this issue. For example, where appointed, guidance from the landscape architect regarding long term maintenance requirements should be considered as part of decisions made for habitat creation and enhancement.

M1.2: Quantifying change in ecological value

Criterion 4 is based on the outputs from completing either a country specific biodiversity metric tool or Ramboll's Global Biodiversity Metric (GBM) tool.

Within the GBM, "biodiversity units" quantify the biodiversity value of on-site habitats before development to provide a baseline and after development to evaluate the change that has occurred. Once the baseline and post construction information has been entered the tool generates a score, expressed as a percentage, which quantifies any losses or gains, against the baseline and takes into account any compensation or enhancements that directly increases habitat condition.

Biodiversity units are determined by quantifying the following: habitat type, conservation priority, quality (condition), strategic significance and area (hectares) throughout the assessed project's lifecycle.

Detailed guidance and information about the calculation methodology of the Global Biodiversity Metric (GBM) tool as well as the calculator tool are available on the Ramboll website (www.ramboll.com/measuring-biodiversity).

M1.3: Appropriate habitat not listed in Global Biodiversity Metric

In cases where an equivalent habitat cannot be found in the metric, the ecologist should choose a similar habitat with the same conservation priority as the actual habitat using their professional judgement.

The ecologist should provide written confirmation and justification for all instances where the actual habitat is not the same as the one listed in the tool.

M1.4: Assigned conservation priority in Global Biodiversity Metric not reflective of actual habitat

Where the ecologist disagrees with the conservation priority assigned to the habitat in the metric, they should use a similar habitat that has the appropriate conservation priority using their professional judgement.

The ecologist should provide written confirmation and justification for all instances where the actual habitat is not the same as the one listed in the tool.

M1.5: Documenting irreplaceable habitat in Global Biodiversity Metric

Irreplaceable habitats are automatically identified in the metric and cannot be changed when the two following conditions are met:

1. The habitat is ranked as 'Very High' for conservation priority
2. Has a strategic significance of 'Critical' or 'Very High'.

Habitats that do not meet the above conditions but based on local conditions and expert ecological judgement, align with irreplaceable status, can be manually identified as such in the "Is habitat irreplaceable?" column.

M2: Ecological enhancement and change in ecological value outside of the site boundary

In line with criteria 2 and 4, in certain circumstances, BREEAM may recognise ecological enhancements which are not within the boundary of the site being assessed:

1. On- site enhancement is not possible.
2. The suitably qualified ecologist (SQE) confirms that the proposed ecological enhancements are appropriate and more effective than can be done solely within the development boundary.
3. The enhancement is made within the zone of influence (see Definitions in Lue 02). The specific zone of influence for the development should be defined by the SQE.
4. There are arrangements in place for the on-going maintenance of the enhanced land. This could be demonstrated by compliance with Lue 05, as well as legal and funding arrangements.

Full justification and robust evidence must be submitted when relying on this approach.

No credits are available where the enhancement/creation is made off-site and outside the zone of influence.

M3: Urban Greening Factor

The Urban Greening Factor (UGF) represents the ratio of vegetated surface area to the total site area. The targets and methodology outlined below are based off the Biotope Area factor, developed by the Berlin Senate Department for Urban Mobility, Transport, Climate Action and the Environment (www.berlin.de/sen/uvk/).

The SQE must use the following calculation to ascertain the UGF, a copy of the calculation should be provided in the SQE's report.

1. For each surface-cover type, assign the corresponding factor score
2. Measure the area of each surface-cover type in m² / ft². This includes the full area of any inclined and vertical vegetation surfaces (such as green walls).
3. Multiply the factor score by the area of the corresponding surface-cover type
4. Add the scores together and divide the combined score by the total site area in square metres to determine the overall UGF score

Table 102: Types of surfaces and weighting factors per m² / ft²

Type of surface	Description	Weighting factors per m² / ft²
Sealed surfaces	Surface is impermeable to air and water and has no plant growth (e.g., concrete, asphalt, slabs with a solid subbase).	0.0

Type of surface	Description	Weighting factors per m² / ft²
Partially sealed surfaces	Surface is permeable to water and air; as a rule, no plant growth (e.g., clinker brick, mosaic paving, slabs with a sand or gravel subbase).	0.1
Semi-open surfaces	Surface is permeable to water and air, water infiltration, but no planned plant growth (e.g., sand, gravel, clinker brick with high water infiltration).	0.2
Greened surfaces	Surface is permeable to water and air, water infiltration and planned and long-term plant growth (e.g., gravel with grass, wooden cobbles, grass paving blocks).	0.4
Vegetation surfaces on a built soil layer, low substrate thickness	Vegetation surfaces that are not connected to the underlying soil and have a 20 to 40 cm thick soil layer e.g. planters, soil layer with lawns, small shrubs, and perennials.	0.5
Vegetation surfaces on a built soil layer, medium substrate thickness	Vegetation surfaces that are not connected to the underlying soil and have a 41 to 80 cm thick soil layer e.g. soil layer with hedges and large shrubs.	0.6
Vegetation surfaces on a built soil layer, high substrate thickness	Vegetation surfaces that are not connected to the underlying soil and have 81 to 150 cm thick soil layer e.g. soil layer with tall and medium trees.	0.7
Vegetation surface on a built soil layer, very high substrate thickness	Vegetation surfaces that are not connected to the underlying soil and have a soil layer with a thickness of more than 150 cm e.g. Soil layer with very tall trees.	0.9
Vegetation surface connected to the underlying soil	Vegetation surface with a high degree of cover; completely air- and water-permeable surface with connection to the underlying soil. If only low volumes of vegetation with little structure are established (e.g. ornamental lawns), the weighting factor is reduced to 0.5.	1.0
Sustainable Drainage System surfaces	Surfaces that manage water run-off from precipitation via infiltration and collection e.g. ditches, infiltration surfaces. The full surface area is measured, regardless of orientation. No exclusively underground infiltration measures.	0.2
Water body	Rainwater fed water body e.g. rainwater-fed ponds, artificial lakes, artificial bogs, artificial wetlands.	0.5
Water body with vegetation	Same as above, plus vegetation in or around the body of water.	0.6
Vertical greenery with connection to the ground	Direct connection of the vertical greenery with the soil. The greenery is supplied with nutrients and water directly through the roots in the soil.	0.5
Vertical greenery without connection to the ground	Vertical or horizontal vegetation on a wall without direct connection to the soil on the ground, e.g. permanent planters with artificial irrigation.	0.7
Extensive roof greening	Nature-like design of the roof surfaces with a substrate thickness under 20 cm without artificial irrigation. If systems for water retention are present the UGF can increase to 0.6 (only for extensive roof greening).	0.5
Semi-intensive roof greening	Mixture of extensive and intensive roof greening with a substrate thickness of 15 to 50 cm (depending on the chosen plantings), usually in combination with artificial irrigation e.g. green roofs with herbs, grasses, perennials and small shrubs.	0.7
Intensive roof greening	Design of the roof similar to ground-based green areas with a substrate thickness more than 50 cm, usually in combination with artificial irrigation e.g. green roofs with medium to tall perennials and shrubs.	0.8

M4: Collating evidence

Guidance Note 41 *Ecology Assessment Reporting Template* (GN41) can be referred to and used to collate information and evidence for the assessment (it is optional, see Lue 03 Managing impacts on ecology – M2: Collating evidence on page 398).

M5: EU Taxonomy

M5.1: EIA

An Environmental Impact Assessment (EIA) or screening has been completed in accordance with Directive 2011/92/EU.

Where an EIA has been carried out, the required mitigation and compensation measures for protecting the environment are implemented.

It is not a requirement to do an EIA but where undertaken it will help meet requirements for criteria 1 to 2.

For this issue, the focus is on the implementation of mitigation and compensation measures identified in assessment.

M5.2: Biodiversity-sensitive areas

For sites/operations located in or near biodiversity-sensitive areas (including the Natura 2000 network of protected areas, UNESCO World Heritage sites and Key Biodiversity Areas, as well as other protected areas), an appropriate assessment, where applicable, has been conducted and based on its conclusions the necessary mitigation measures are implemented. For this issue, the focus is on the implementation of mitigation measures identified in the assessment.

Compliance notes

Ref	Terms	Description
CN1	Country specific biodiversity metric	A habitat-based metric designed to quantify the impact on biodiversity pre- and post-development. They quantify and reduce impacts to deliver no net loss or net gain/nature positive actions. Where available, country specific biodiversity metrics should be used in preference to the Global Biodiversity Metric as they include more specific and relevant habitat types to the country/region that the project is being assessed in. If you wish to use a country specific biodiversity metric to demonstrate compliance with the criteria, please submit via the Approved Standards process. We will also publish a list on the BREEAM Knowledge Base as these are approved.
CN2	Local version of Urban Greening Factor	Where a project team wants to use a locally adapted version of the Urban Greening Factor, as an alternative to the methodology outlined previously, they must submit this for review via the Approved Standards process.
CN3	France – Cofficient de Biotope Surfacique harmonisé (Harmonized CBS – CBSh)	Projects in France should use the methodology and calculation outlined at: cap2030-gt7-biodiv.dimn-cstb.fr/webapp/ The targets for UGF outlined in Table 101 should also be applied to CBSh.
CN4	Ecological enhancement implementation time-frames	At the post-construction assessment stage of large or phased developments, for example, some ecological enhancements may not have been completed. This may include features which are to be added at a later date in the appropriate planting season. In such cases, it is acceptable to provide evidence from the client or principal contractor confirming that the enhancements will be completed within an appropriate period, advised by the SQE.

Evidence

Criteria	Interim design stage	Final post-construction stage
2	Report or letters detailing the recommendations for measures of ecological enhancement. Drawings and specifications demonstrating that the recommendations have been implemented in the design.	Site visit confirming measures have been carried out in-practice, in line with recommendations.
3	Evidence demonstrating that data has been submitted to a local environmental record	No further actions required post-construction; no additional evidence is required other than

Criteria	Interim design stage	Final post-construction stage
	centre, where relevant.	that listed for the design stage.
4	Completed version of the Biodiversity Metric tool. Evidence to support the data input within the tool such as ecological survey report and landscape plans (existing and proposed).	Completed version of the as-built Biodiversity Metric tool. AND Site inspection reports, as-built landscape plans and/or planting schedules to show the changes in the Biodiversity Metric tool have been carried out as planned, in line with SQE's recommendations.
5	Excel (or similar) showing calculation of UGF including all inputs. Landscape plans (existing and proposed) and specifications demonstrating that the measures have been implemented in the design.	Site visit confirming measures have been carried out in-practice, in line with recommendations.
EU Taxonomy		
M5	Evidence that mitigation and enhancement measures have been implemented into the design.	Site visit confirming measures have been carried out in-practice, in line with recommendations.

Definitions

Biodiversity net gain

Biodiversity net gain (BNG) is a way of creating and improving natural habitats. BNG makes sure development has a measurably positive impact ('net gain') on biodiversity, compared to what was there before development. This is calculated as a percentage change in pre and post development amount of biodiversity units.

1. Conservation priority
2. Strategic significance
3. Difficulty risk
4. Temporal risk
5. Spatial risk

Biodiversity units (BU)

The units in which relative biodiversity value of an ecological feature is measured, which can be calculated using a number of different metrics such as the Global Biodiversity Metric (GBM) and the Statutory Biodiversity Metric (SBM). The biodiversity unit for each feature is calculated using a range of different components, depending on what metric is used:

The components used in the Global Biodiversity Metric are as follows:

1. Habitat condition
2. Conservation priority
3. Strategic significance
4. Difficulty risk
5. Temporal risk
6. Spatial risk

The components used in the Statutory Biodiversity metric are as follows:

1. Distinctiveness
2. Condition
3. Strategic significance
4. Riparian zone encroachment
5. Watercourse encroachment

Statutory Biodiversity Metric differs from the Global Biodiversity Metric only produces output for the BU for one overall 'module'. The Statutory Biodiversity Metric differs as each feature is assigned to one of the 'modules' below and the BUs are added up for each one:

1. Area habitat
2. Hedgerow habitat
3. Watercourse habitat

Coefficient de Biotope de Surface harmonisé (CBSh) (France)

The CBSh is an indicator developed within the Working Group 7 – Biodiversity, coordinated by CSTB, as part of the CAP 2030 project. It is used by real estate and property development companies to measure the ecological impact of their projects. It is a weighted score between 0 and 1 that assesses both the quality and quantity of a site's green areas and water resources.

The CAP 2030 project is led by an Ecological Interest Group (GIE) composed of three associations (Alliance HQE-GBC, Collectif des Démarches Quartiers Bâtiments Durables, and Collectif Effinergie), with the support of DGALN and ADEME, and in collaboration with CSTB and the Plan Bâtiment Durable. Its aim is to build a common reference framework, shared by stakeholders, to go beyond the RE2020 regulation.

Conservation priority

Conservation priorities are areas or species that are most important to conserve due to their ecological value or vulnerability. These areas may include:

— Wilderness areas, or areas that are biologically intact and have little human intervention.
— Areas with significant biodiversity.
— Areas that are critical habitats for endangered or vulnerable species.
— Areas that share boundaries with existing protected land.

Ecological value

The importance, worth, or usefulness of a species, habitat or ecosystem in terms of its impact on other species and habitats, as well as the other environmental, social, cultural and economic value that can be delivered from species and habitats and their interactions (ecosystem services) specific to a geographical frame of reference.

External works

External works are defined as any activities within the scope of the development that occur outside of the building being refurbished or fitted out.

Local environmental record centres

Local environment record centres are not-for-profit organisations that collate and manage information on the natural environment for a defined geographic area. They record and manage information on habitats, species and sites across their region. The data held is provided by recorders, professional ecologists and the public. This information is made available to a wide range of individuals and organisations for use in nature conservation, development planning and research. If an environmental record centre does not exist in the country of assessment, the SQE should choose the most appropriate organisation to submit the information to and should provide justification for this.

Net loss

Loss of ecological value on the site resulting from construction and associated activities. For more information, see CIEEM, CIRIA & IEMA.

Site area

The area of the land enclosed by the boundary of the BREEAM assessment.

Strategic significance

Defines whether the habitat is a local priority or in a priority area for enhancement.

Suitably qualified ecologist (SQE)

An individual achieving all the following items can be 'suitably qualified' for the purposes of compliance with BREEAM:

1. Holds a degree or equivalent qualification in ecology or a related subject comprising a significant ecology component.
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. The relevant experience must relate to the country that the assessment is being carried out in.

Ecology related subject – Depending on the ecological content (minimum 60%), the following degrees might be considered relevant: Ecology, Biological Sciences, Zoology, Botany, Countryside Management, Environmental Sciences, Marine and Freshwater Management, Earth Sciences, Agriculture, Forestry, Geography, Landscape Management.

Urban

Areas forming settlements with populations of over 10,000 should be defined as urban. However, it can also include the redevelopment of brownfield or post-industrial sites in rural locations.

Urban Greening Factor

The Urban Greening Factor (UGF) is a tool used to incorporate green infrastructure into urban developments. It originated in Berlin in 1990 and was designed to address growing urban densification and the need for more green spaces. Since then, the UGF has been adopted by cities across Europe, Asia, North America, and Australia. The Urban Greening Factor is now a prominent green infrastructure policy tool in the adopted London Plan (March 2021) and Berlin in their Biotope Area Factor policy. The English name, Urban Greening Factor, is used to emphasise the role of the tool in providing additional site-based green infrastructure through the development process to complement existing networks of public parks and other types of greenspaces.

Additional information can be found at: www.berlin.de/sen/uvk/natur-und-gruen/landschaftsplanung/bff-biotopflaechenfaktor/

Additional information

Biodiversity Net Gain, Urban Greening Factor, and Sustainable Drainage Systems

Sustainable Drainage Systems (SuDS) used to minimise watercourse pollution in Pol 03 can be designed with biodiversity in mind and can therefore contribute to the Biodiversity Net Gain and Urban Greening Factor scores. Close collaboration between SuDS specialists/engineers, landscape architects, and ecologists will ensure multiple objectives are met for the project.

Ramboll's European Biodiversity Metric

Allows quantification of both positive and negative land use impacts regardless of location or habitat type. A tool for assessing biodiversity value based on key indicators of ecological integrity tailored to the European Nature Information System. This metric enables effective measurement and informed decision-making for biodiversity management at sites around the world. It is an open-source tool.

For more information, see: www.ramboll.com/measuring-biodiversity

Ramboll’s Global Biodiversity Metric

Allows quantification of both positive and negative land use impacts regardless of location or habitat type. A tool for assessing biodiversity value based on key indicators of ecological integrity tailored to the IUCN Global Ecosystem Typology. This metric enables effective measurement and informed decision-making for biodiversity management at sites around the world. It is an open-source tool.

For more information, see: www.ramboll.com/measuring-biodiversity

Lue 04b Ecological change and enhancement

(all buildings, UK)

For buildings outside the UK, see Lue 04a Ecological change and enhancement.

Aim

To enhance ecological value of the area associated with the site in support of local, regional, and national priorities.

Overview

Assessment type	Credits available	Minimum standards	Applicable assessment criteria
Part 1: Fabric and structure	up to 4 + 1 exemplary	None	All (see ref 1.0 and 1.2)
Part 2: Core services	up to 4 + 1 exemplary	None	Scope dependent (see ref 1.1)
Part 3: Local services	up to 4 + 1 exemplary	None	Scope dependent (see ref 1.1)
Part 4: Interior design	up to 4 + 1 exemplary	None	Scope dependent (see ref 1.1)
EU Taxonomy	-	-	All (see M4)

Assessment type specific notes

Ref	Assessment type specific note
1.0	**New build extensions** For Part 2, 3, or 4 assessments, this issue is only applicable where new build extensions or external works are included in the scope of the project.
1.1	**External works included in scope** For Part 2, 3, or 4 assessments, this issue is only applicable where new build extensions or external works are included in the scope of the project.
1.2	**Part 1 assessments** Where an ecologist has made recommendations for measures of enhancement in Lue 02, only the ecological enhancement criteria are applicable. Where new build extensions or external works are included in the scope of the project, all criteria apply.

Building type specific notes

Ref	Building type specific note
-	None

Assessment criteria

Prerequisite – Managing negative impacts on ecology

1 Achieve criteria 2 and 3 in Lue 03, where measures were identified for managing impacts on ecology in Lue 02.

One credit – Ecological enhancement

2 Measures have been implemented that enhance ecological value, which are based on input from the project team and SQE in collaboration with representative stakeholders and data collated as part of 'One credit – Determining ecological outcomes' in Lue 02.

3 Data collated are analysed and where potentially valuable, provided to the local environmental records centre nearest to, or relevant for, the site.

Up to three credits (plus one exemplary credit) – Quantifying change in ecological value

Site baseline > 0.1 BU

4 Up to three credits are available based on the scale in Table 103 below. The enhancement measures that contribute to the score for biodiversity net gain should be implemented in the following order:

4.a On-site within the boundary, and where this is not feasible,

4.b Enhancements within the zone of influence/wider development area, and where this is not feasible,

4.c Off-site units following the rules of the Statutory Biodiversity Metric, subject to the following:

4.c.i The SQE confirms that better outcomes for nature can be achieved off-site and/or off-site enhancement would be more be effective than what can be done solely in the development boundary/zone of influence.

4.c.ii There has been no net loss of biodiversity on-site.

4.c.iii There are arrangements in place for the on-going maintenance of the enhanced land to ensure the habitat is safeguarded over a 30-year period.

Table 103: Credits awarded based on output from the Statutory Biodiversity Metric tool

Total project biodiversity change	Credits
≥ 10%	1
≥ 20%	2
≥ 30%	3
≥ 40%	3 + 1 exemplary

OR

Site baseline ≤ 0.1 BU

5 Up to three credits are available based on biodiversity units (BUs) per site area (ha) or per 10 m of hedgerow post development as shown in Table 104 below. This is only based on the hedgerow-based metric and area-based metric. For more information, see M1.4.

Table 104: Credits awarded based on biodiversity units (BUs) per site area (ha) and per length of hedgerow

Biodiversity units per site area (BU/ha)	Biodiversity units per 10m length of hedgerow (BU/10m length)	Credits
≥ 1.50	≥ 0.01	1
≥ 2.00	≥ 0.03	2
≥ 2.50	≥ 0.04	3
≥ 3.00	≥ 0.05	3 + 1 exemplary

Methodology

M1: Ecological enhancement and quantifying change in ecological value

M1.1: Enhancement measures

For criterion 2, the ecologist's report must clearly justify how the selected measures meaningfully enhance ecological value.

This criterion recognises enhancement measures that have been carried out in line with good practice recommended by an SQE, which build on mitigation measures taken in Lue 03. This also supports meeting good practice principles of biodiversity net-gain (CIRIA, CIEEM, IEMA)[80] before quantifying the change in ecological value in criteria 4 or 5.

The following list provides examples of measures that could be considered by the SQE:

1. Recommendations from biodiversity action plans and/or local nature recovery strategies.
2. Planting that supports at risk species identified in the IUCN Red List, with species selected for their ecological contributions and adaptability to local conditions.
3. Planting appropriate species with a known attraction or benefit to local wildlife or to boost viability of local plant populations.
4. Adopting horticultural good practice in landscape construction, management, and maintenance (e.g. no or low use of residual pesticides and herbicides).
5. Installing features to encourage existing local wildlife (such as nesting, roosting and insect boxes) at appropriate locations on the site and in line with relevant guidance.
6. Increasing the porosity and texture of surfaces on site to encourage wildlife (e.g. improving the texture of the soil and making it more porous will encourage more plants to grow).
7. Introducing surface water features into the environment to encourage birds and other wildlife (e.g. wildlife ponds, wetland areas).
8. Improvement of soil health and fertility.

M1.2: Collaboration throughout the project

For criterion 2, feedback from relevant stakeholders in Lue 02 informs decisions made in this issue. For example, where appointed, guidance from the landscape architect regarding long term maintenance requirements should be considered as part of decisions made for habitat creation and enhancement.

M1.3: Quantifying change in ecological value – full method (for sites with a baseline > 0.1 BU)

Criterion 4 is based on the outputs from completing the Statutory Biodiversity Metric (SBM) tool.

The Statutory Biodiversity Metric (SBM) tool calculates the percentage biodiversity net gain, among other outputs, from the following three metrics:

— Habitats
— Watercourses
— Hedgerows

Within each metric, "biodiversity units" represent the ecological value of the habitat before and after development.

These units are determined by quantifying the following: type, distinctiveness, condition, and area or length throughout the assessed project lifecycle.

The output with the lowest percentage score (rounded to the nearest whole percentage point) is used to identify the reward level available for the development which is shown in Table 103 on the previous page.

Where a metric is not present, for example a watercourse, that metric can be ignored and the lowest of the other two metrics should be used.

Information about the calculation methodology of the Statutory Biodiversity Metric (SBM) tool as well as other supporting documents are available on the UK government website (www.gov.uk/government/publications/statutory-biodiversity-metric-tools-and-guides).

M1.4: Quantifying change in ecological value – low baseline method (for sites with a baseline ≤ 0.1 BU)

When a site has a low baseline of 0.1 biodiversity units (BU) or lower, the total biodiversity net gain calculation would show an output that would either show an overestimated figure that is not representative of reality or would not show a score at all if the baseline is 0. This method provides an alternative calculation which better measures and rewards biodiversity improvements where little biodiversity exists pre-development.

When following criterion 5 you need to fill in either the SSM or SBM for both baseline and post development for the habitat-based metric. If the baseline is 0 the pre-development area tab needs to be left blank.

Using the headline results tab of the SSM or SBM, the difference between the baseline habitat units and post-development habitat units needs to be calculated and divided by the number of hectares of the site. This output will determine the number of credits as shown in Table 104. Please see the formula below:

$$Area\ unit\ output = \frac{BUA_{Post} - BUA_{Pre}}{A}$$

where:

BUA_{Pre} = Area Biodiversity Units pre-development

BUA_{Post} = Area Biodiversity Units post-development

A = Area in hectares (ha)

For the calculation of hedgerows, the difference between the baseline hedgerow units and post-development hedgerow and hedgerow units needs to be calculated and divided by the number of metres of hedgerows divided by 10. This output will determine the number of credits shown in Table 104. Please see the formula below:

$$Hedgerow\ unit\ output = \frac{BUH_{Post} - BUH_{Pre}}{(Length_H/10)}$$

where:

BUH_{Pre} = Hedgerow Biodiversity Units pre-development

BUH_{Post} = Hedgerow Biodiversity Units post-development

$Length_H$ = Length of hedgerow in metres

If both hedgerow and habitat metrics are present, the lowest number of credits must be awarded, e.g. if 2 credits are awarded based on the area-based metric and 1 credit is awarded based on the hedgerow-based metric, then 1 credit must be awarded for criterion 5.

If watercourses are present when using the low baseline methodology, you need to exclude them from the calculations.

M1.5: The Small Sites Metric (SSM)

Figure 3 on the next page shows the steps to determine whether the Small Sites Metric (SSM) can be used instead of the full Statutory Biodiversity Metric (SBM). This is based on the rules set out in the Small Sites Metric guidance.

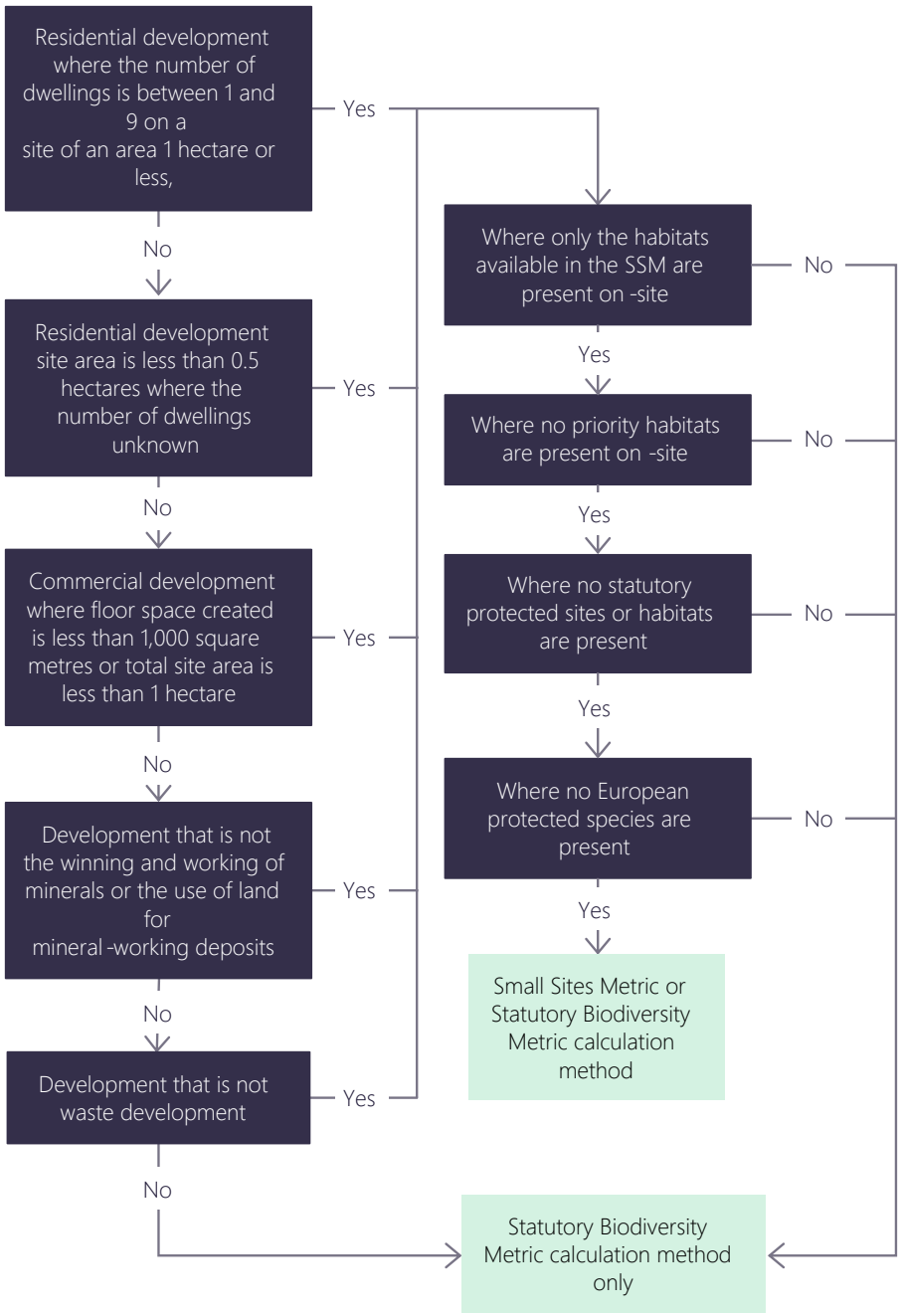


Figure 3: Steps to determine whether the Small Sites Metric can be used

M2: Ecological enhancement and change in ecological value outside of the site boundary

In line with criteria 2 and 4, in certain circumstances, BREEAM may recognise ecological creation and enhancements which are not within the boundary of the site being assessed.

Off-site enhancement may be accepted where:

1. The comprehensive route is followed and the SQE confirms:
    a. Better outcomes for nature can be achieved off-site AND/OR
    b. The proposed ecological creation and enhancements are appropriate and more effective than can be done solely within the development boundary.
2. The biodiversity metric confirms that there is no net loss on-site.

3. There are arrangements in place for the on-going maintenance of the enhanced land to ensure the habitat is safeguarded over a 30-year period. This could be demonstrated by planning condition or s106 or conservation covenant and approved by the SQE. Full justification and robust evidence must be submitted when relying on this approach.

M3: Collating evidence

Guidance Note 41 *Ecology Assessment Reporting Template* (GN41) can be referred to and used to collate information and evidence for the assessment (it is optional, see Lue 03 Managing impacts on ecology – M2: Collating evidence on page 398).

M4: EU Taxonomy

M4.1: EIA

An Environmental Impact Assessment (EIA) or screening has been completed in accordance with Directive 2011/92/EU.

Where an EIA has been carried out, the required mitigation and compensation measures for protecting the environment are implemented.

It is not a requirement to do an EIA but where undertaken it will help meet requirements for criteria 1 to 2.

For this issue, the focus is on the implementation of mitigation and compensation measures identified in assessment.

M4.2: Biodiversity-sensitive areas

For sites/operations located in or near biodiversity-sensitive areas (including the Natura 2000 network of protected areas, UNESCO World Heritage sites and Key Biodiversity Areas, as well as other protected areas), an appropriate assessment, where applicable, has been conducted and based on its conclusions the necessary mitigation measures are implemented. For this issue, the focus is on the implementation of mitigation measures identified in the assessment.

Compliance notes

None.

Evidence

Criteria	Interim design stage	Final post-construction stage
2	Report or letters detailing the recommendations for measures of ecological enhancement. Drawings and specifications demonstrating that the recommendations have been implemented in the design.	Site visit confirming measures have been carried out in-practice, in line with recommendations.
3	Evidence demonstrating that data has been submitted to a local environmental record centre, where relevant.	No further actions required post-construction; no additional evidence is required other than that listed for the design stage.
4	Completed version of the Statutory Biodiversity Metric (SBM) or Small Sites Metric (SSM) tool. Evidence to support the data input within the tool such as ecological survey report and landscape plans (existing and proposed).	Completed version of the as-built Biodiversity Metric tool. AND Site inspection reports, as-built landscape plans and/or planting schedules to show the changes in the Biodiversity Metric tool have been carried out as planned, in line with SQE's recommendations.
5	Output from the Statutory Biodiversity Metric (SBM) or Small Sites Metric (SSM) tool and the size of the site to show that the requirements in Table 104 have been met. Evidence to support the data input within the	As for interim design stage. AND Site inspection report or as-built landscape plans or site plans.

Criteria	Interim design stage	Final post-construction stage
	tool such as ecological survey report and landscape plans (existing and proposed).	
EU Taxonomy		
M4	Evidence that mitigation and enhancement measures have been implemented into the design.	Site visit confirming measures have been carried out in-practice, in line with recommendations.

Definitions

Biodiversity net gain

Biodiversity net gain (BNG) is a way of creating and improving natural habitats. BNG makes sure development has a measurably positive impact ('net gain') on biodiversity, compared to what was there before development. This is calculated as a percentage change in pre and post development amount of biodiversity units.

1. Conservation priority
2. Strategic significance
3. Difficulty risk
4. Temporal risk
5. Spatial risk

Biodiversity units (BU)

The units in which relative biodiversity value of an ecological feature is measured, which can be calculated using a number of different metrics such as the Global Biodiversity Metric (GBM) and the Statutory Biodiversity Metric (SBM). The biodiversity unit for each feature is calculated using a range of different components, depending on what metric is used:

The components used in the Global Biodiversity Metric are as follows:

1. Habitat condition
2. Conservation priority
3. Strategic significance
4. Difficulty risk
5. Temporal risk
6. Spatial risk

The components used in the Statutory Biodiversity metric are as follows:

1. Distinctiveness
2. Condition
3. Strategic significance
4. Riparian zone encroachment
5. Watercourse encroachment

Statutory Biodiversity Metric differs from the Global Biodiversity Metric only produces output for the BU for one overall 'module'. The Statutory Biodiversity Metric differs as each feature is assigned to one of the 'modules' below and the BUs are added up for each one:

1. Area habitat
2. Hedgerow habitat
3. Watercourse habitat

Conservation priority

Conservation priorities are areas or species that are most important to conserve due to their ecological value or vulnerability. These areas may include:

— Wilderness areas, or areas that are biologically intact and have little human intervention.
— Areas with significant biodiversity.
— Areas that are critical habitats for endangered or vulnerable species.
— Areas that share boundaries with existing protected land.

Development footprint

The development footprint consists of the site, considered to be the land enclosed by the boundary of the BREEAM assessment, and includes any land used for buildings, hardstanding, landscaping, site access or where construction work is carried out (or land being disturbed in any other way). It also includes any areas used for temporary site storage and buildings. If it is not known exactly where buildings, hardstanding, site access, temporary storage and buildings will be located, it must be assumed that the development footprint is the entire development site.

For the change in ecological value calculation, this area will also include any land outside the development boundary where there is an indirect impact on biodiversity, including but not limited to the zone of influence, and land being used to compensate for impacts, either on the site or outside it as a biodiversity offset.

Ecological value

The importance, worth, or usefulness of a species, habitat or ecosystem in terms of its impact on other species and habitats, as well as the other environmental, social, cultural and economic value that can be delivered from species and habitats and their interactions (ecosystem services) specific to a geographical frame of reference.

External works

External works are defined as any activities within the scope of the development that occur outside of the building being refurbished or fitted out.

Local environmental record centres

Local environment record centres are not-for-profit organisations that collate and manage information on the natural environment for a defined geographic area. They record and manage information on habitats, species and sites across their region. The data held is provided by recorders, professional ecologists and the public. This information is made available to a wide range of individuals and organisations for use in nature conservation, development planning and research. If an environmental record centre does not exist in the country of assessment, the SQE should choose the most appropriate organisation to submit the information to and should provide justification for this.

Net loss

Loss of ecological value on the site resulting from construction and associated activities. For more information, see CIEEM, CIRIA & IEMA.

Site area

The area of the land enclosed by the boundary of the BREEAM assessment.

Small Sites Metric (SSM)

The Small Sites Metric is a simplified version of the Statutory Biodiversity Metric (SBM) for use on small sites.(81)

For further details on the rules about which sites can use this approach, please refer to information at:
www.gov.uk/government/publications/statutory-biodiversity-metric-tools-and-guides

Strategic significance

Defines whether the habitat is a local priority or in a priority area for enhancement.

Suitably qualified ecologist (SQE)

An individual achieving all the following items can be 'suitably qualified' for the purposes of compliance with BREEAM:

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, Preliminary Ecological Appraisals (PEA), Phase 2 habitat and fauna surveys, and habitat creation.
3. Is covered by a professional code of conduct and subject to peer review. Full members of the following organisations, who meet the above criteria, are deemed suitably qualified ecologists for the purposes of BREEAM:
    a. Chartered Institute of Ecology and Environmental Management (CIEEM)
    b. Chartered Institution of Water and Environmental Management (CIWEM)

c. Institute of Environmental Management and Assessment (IEMA)
d. Institution of Environmental Sciences (IES)
e. Landscape Institute (LI)
f. Royal Society of Biology

Urban

Areas forming settlements with populations of over 10,000 should be defined as urban. However, it can also include the redevelopment of brownfield or post-industrial sites in rural locations.

Additional information

Biodiversity Net Gain and Sustainable Drainage Systems

Sustainable Drainage Systems (SuDS) used to minimise watercourse pollution in Pol 03 can be designed with biodiversity in mind and can therefore contribute to the Biodiversity Net Gain scores. Close collaboration between SuDS specialists/engineers, landscape architects, and ecologists will ensure multiple objectives are met for the project.

Statutory Biodiversity Metric (England)

Legislation was introduced in England on 12 February 2024 that required developments to document a 10% increase in Biodiversity Net Gain (BNG) upon completion of the development.

The Statutory Biodiversity Metric is used to calculate BNG in three types of units: habitat, hedgerow, and watercourse units. These are combined to assess the total net change and determine whether the 10% requirement has been achieved.

Lue 05 Long term ecological management

(all buildings)

Aim

To secure ongoing monitoring, management and maintenance of the site and its habitats and ecological features, to ensure intended outcomes are realised for the long term.

Overview

Assessment type	Credits available	Minimum standards	Applicable assessment criteria
Part 1: Fabric and structure	up to 2	None	Scope dependent (see ref 1.0, 1.1, and 1.2)
Part 2: Core services	up to 2	None	Scope dependent (see ref 1.1)
Part 3: Local services	up to 2	None	Scope dependent (see ref 1.1)
Part 4: Interior design	up to 2	None	Scope dependent (see ref 1.1)

Assessment type specific notes

Ref	Assessment type specific note
1.0	**New build extensions** For Part 2, 3, or 4 assessments, this issue is only applicable where new build extensions or external works are included in the scope of the project.
1.1	**External works included in scope** For Part 2, 3, or 4 assessments, this issue is only applicable where new build extensions or external works are included in the scope of the project.
1.2	**Part 1 assessments** Where measures have been implemented in Lue 03 and Lue 04 all criteria are applicable. Where new build extensions or external works are included in the scope of the project, all criteria apply.

Building type specific notes

Ref	Building type specific note
-	None

Assessment criteria

Prerequisite – Ecological change and enhancement

1 Achieve at least one credit in either Lue 03 or Lue 04.

One credit – Handover to building owner or tenant

2 A section on ecology and biodiversity has been included as part of the information supplied to the tenant or building owner. This information must be in a separate document from the landscape and ecology management plan (which is covered by criterion 3) and:

2.a Inform the building owner or tenant about local ecological features and biodiversity associated with the site (see M1) including an 'as-built' biodiversity metric calculation (where relevant).

2.b Include detailed management and maintenance plans and relevant handover information to minimise loss of planting during establishment phase (see M1).

One credit – Landscape and ecology management plan

3 A landscape and ecology management plan, or equivalent, has been developed by a suitably qualified ecologist (SQE). This will cover detailed plans for an initial 5-year establishment period and maintenance of the scheme. The plan includes:

3.a Actions and responsibilities of relevant individuals before handover.

3.b The ecological value and condition of the site at handover and how this is expected to develop and change over time.

3.c Procedures to monitor and review the on-going implementation and effectiveness of measures, incorporating an adaptive management approach.

3.d Risk register, including trigger for action and remedial measures with consideration on how these feed into monitoring requirements (see M2.4).

3.e Maintenance and management plans for the retained, enhanced and created habitats, as well as any features for protected species. This should include a detailed work schedule outlining relevant maintenance on a monthly basis for the first five years after completion.

3.f Identifying opportunities for ongoing alignment with activities external to the asset, where relevant.

3.g Clearly defined responsibilities and competencies of those delivering the plan.

3.h A reference to any current or future legislation requirements (local, national, or regional) that apply to the site regarding the protection of species and habitats (and where applicable refer to biodiversity action strategies or action plans).

Methodology

M1: Handover information

For criterion 2, the handover information includes, as appropriate:

1. Details of the ecological value within the property boundary (e.g. public and private gardens, green roofs), common areas (e.g. communal garden), and the surrounding area (e.g. public recreational space).
2. The benefits of the ecological value to the occupants and the broader community.
3. Guidance on:
    a. How the occupants can make the most of the local ecology and contribute to its management (e.g. planting ecologically appropriate species in their property).
    b. Harmful actions (e.g. disrupting wildlife corridors, planting invasive species, or allowing invasive species to colonise and spread, pesticide and herbicide use, and the impacts of using peat products, the extraction of which releases carbon dioxide in the atmosphere and destroys important habitats).
4. Highlight relevant actions that can enhance ecological value.
5. Contact details for:
    a. Responsible individuals for the management and maintenance of the local ecology.
    b. Sources of local information on biodiversity and ecological management (including management companies and local wildlife trusts).

M2: Landscape and ecology management plan

M2.1: Coordination with other operational and management tasks

Wherever possible, management of biodiversity features should be coordinated with other site management requirements, particularly the management of landscape features where there is often considerable overlap of aims, objectives and necessary management actions. This may be achieved through the preparation of an integrated landscape and ecological management plan.

M2.2: Level of detail

The level of detail required for any given site should be whatever is necessary to ensure the effective management of the biodiversity features that are present. The approach to management planning should remain flexible so that time, money, and energy are not expended on the implementation of non-essential or inappropriate management works.

For some large and complex sites containing a variety of biodiversity and landscape features, a comprehensive management plan covering a broad range of management works should be prepared.

However, on smaller sites, the preparation and implementation of full-scale management might be beyond the resources available or simply be unnecessary. In such circumstances, an outline management document may be prepared.

M2.3: Monitoring and reporting biodiversity outcomes

Monitoring should be undertaken to:

1. Ensure compliance with planning requirements regarding any protected species imposed by government agency.
2. Establish the success and effectiveness of measures undertaken to avoid, mitigate, restore, or compensate for impacts and/or to achieve biodiversity enhancement.

Where monitoring identifies non-compliance with planning conditions or regulatory requirements, the management plan describes procedures and responsibility. This should be used where appropriate by the relevant decision maker to rectify non-compliance and implement preventive measures to ensure that this does not happen again.

M2.4: Risk register for biodiversity net gain sites

Provide a site-wide risk register associated with managing each habitat type outlined in the biodiversity metric calculation, where undertaken. Consider what risks might impact any net gain targets being achieved and how these can be remediated. The list of potential risks should be as comprehensive as possible to provide confidence that the management plan objectives will be met. This applies to all countries.

M2.5: Activities external to the asset

This item will be relevant where measures have been implemented that align with ecological initiatives within the zone of influence or wider community, or where the site impacts sensitive areas. It would also be applicable where relevant ongoing actions were identified through consultation with wider stakeholders as per Lue 02.

Compliance notes

None.

Evidence

Criteria	Interim design stage	Final post-construction stage
Handover to building owner or tenant		
2	Draft copy of the ecology and biodiversity handover information.	Copy of the final ecology and biodiversity handover information. Evidence to confirm it has been issued to the building owner or tenant.
Landscape and ecology management plan		
3	Draft copy of the landscape and ecology management plan. OR The relevant section or clauses of the building specification or contract confirming its development and scope.	Copy of the final landscape and ecology management plan.

Definitions

Adaptive management

An approach that involves monitoring and evaluating the effectiveness of actions then adjusting as necessary to improve outcomes over time.

Ecological feature

Examples of ecological features include habitats, ecosystems, and species.

External works

All items outside the building footprint but inside the site boundary, encompassing wastewater and surface water drains, supply of utilities (e.g. gas, electricity and cabled services), footpaths, and access for vehicles including car parks, and hard and soft landscaping.

Suitably qualified ecologist (SQE)

An individual achieving all the following items can be 'suitably qualified' for the purposes of compliance with BREEAM:

1. Holds a degree or equivalent qualification in ecology or a related subject comprising a significant ecology component.
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. The relevant experience must relate to the country that the assessment is being carried out in.

Ecology related subject – Depending on the ecological content (minimum 60%), the following degrees might be considered relevant: Ecology, Biological Sciences, Zoology, Botany, Countryside Management, Environmental Sciences, Marine and Freshwater Management, Earth Sciences, Agriculture, Forestry, Geography, Landscape Management.

Additional information

None.

Pollution



Summary

This category addresses the prevention and control of pollution associated with the building's location and use. The issues in this section aim to mitigate the building's impact on surrounding communities and the environment by managing air and water emissions, as well as light and noise pollution.

Assessment issues

Pol 01 Impact of refrigerants	3 credits
Pol 02 Local air quality	3 credits
Pol 03 Minimising watercourse pollution	1 credit
Pol 04 Reduction of nighttime light pollution	1 credit
Pol 05 Reduction of noise pollution	1 credit

Pol 01 Impact of refrigerants

(all buildings)

Aim

To reduce the impact of greenhouse gas emissions arising from the leakage of refrigerants used in heating and cooling systems in the building.

Overview

Assessment type	Credits available	Minimum standards	Applicable assessment criteria
Part 1: Fabric and structure	0	None	Not applicable
Part 2: Core services	3	Outstanding	All (scope dependent, see ref 1.0)
Part 3: Local services	3	Outstanding	All (scope dependent, see ref 1.1)
Part 4: Interior design	3	Outstanding	All (scope dependent, see ref 1.2)

Assessment type specific notes

Ref	Assessment type specific note
1.0	**Parts 1 and/or Part 2 – Shell and core** If refrigerant-based systems are required and specified for the fit-out, credits can only be awarded if the green lease agreement includes clauses that ensure the Pol 01 criteria are met. If no such clauses are included, the issue remains applicable, but no credits can be awarded.
1.1	**Part 3 – Local services** This issue applies where refrigerants are used in systems local to the assessed area. Local services are defined as systems that serve only the tenanted or refurbished space, such as split units or standalone air-conditioning systems. Where systems in the assessed area are connected to core services (e.g. fan coil units connected to a central chilled water system), and the refrigerant is located in the plant outside the assessed area, this issue is not applicable under Part 3. In such cases, refrigerants are assessed only under Part 2: Core Services. Systems that serve multiple areas beyond the assessed space are considered part of the core services and are assessed under Part 2 only.
1.2	**Part 4 – Display chiller cabinets and display freezers** This issue is applicable where local systems (such as standalone display cabinets or freezers) containing refrigerants are specified as part of the project scope. These must be assessed under this issue, regardless of refrigerant charge, including systems with a charge of 6 kg or less. Where display chillers or freezers are connected to a centralised refrigeration system or chiller plant, refrigerants are assessed under Part 2: Core services, not Part 4. If no display chiller cabinets or freezers are installed as part of the interior design works, this issue is not applicable under Part 4.

Building type specific notes

Ref	Building type specific note
-	None

Issue specific notes

Ref	Issue specific note
3.0	**Unoccupied or non-conditioned buildings** Credits under this issue should be filtered out where none of the internal areas of the building are intended to be occupied, including cold storage, or contain process-based cooling loads such as those required for server rooms or specialist equipment.

Assessment criteria

Three credits – No refrigerant use

1 Where no refrigerants are required across the building or site within any installed plant or systems, including both refurbished and non-refurbished areas.

Up to three credits – Buildings with systems that use refrigerants

Prerequisite – Systems with refrigerants

2 All systems with electric compressors must comply with relevant safety standards for installing refrigerant systems (see M2.1).

3 The refrigerants used must have an ozone depletion potential of zero (see M2.2).

Up to two credits – Impact of refrigerant

One credit

4 Systems using refrigerants (see M3) must have an average direct effect life cycle (DELC) carbon dioxide equivalent (CO_2e) emission rate of < 1000 $kgCO_2e$ per kW of cooling or heating capacity.

Two credits

5 Systems using refrigerants (see M3) must either:

5.a Have an average direct effect life cycle (DELC) carbon dioxide equivalent (CO_2e) emission rate of < 100 $kgCO_2e$ per kW cooling or heating capacity.

OR

5.b Use a refrigerant with a global warming potential (GWP) of < 10 $kgCO_2e/kg$.

One credit – Leak detection

6 Systems using refrigerants are either:

6.a Hermetically sealed.

OR

6.b The refrigerant charge volume is < 500 tonnes of carbon dioxide equivalent (CO_2e).

OR

6.c Use environmentally benign refrigerants (see M4.1).

OR

7 There must be either:

7.a A permanent automated refrigerant leak detection system that is capable of continuously monitoring for leaks.

OR

7.b An inbuilt automated diagnostic procedure for detecting leakage capable of continuously monitoring for leaks.

8 The leak detection system facilitates the isolation and containment of the remaining refrigerant charge in response to a leak detection incident.

Methodology

M1: Refrigerant systems included in the assessment

All fixed refrigerant systems in the building must be included in the assessment. This includes commercial display cabinets and freezers, even where the refrigerant charge is 6 kg or less, except for:

- Systems used for industrial processes.
- Systems that form part of on-site district heating or district cooling generators where the design team has no control over the specification of the system.
- Small appliances with self-contained refrigeration systems.
- Existing systems that aren't being upgraded may also be excluded.

M2: Prerequisite – Systems with refrigerants

M2.1: Safety standards for installation of refrigeration systems

Relevant safety standards include:

- EN 378-3:2016+A1:2020 – Refrigerating systems and heat pumps. Safety and environmental requirements – Installation site and personal protection
- ISO 5149:2014 – Refrigeration systems and heat pumps
- ASHRAE 15-2016 – Safety Standard for Refrigeration Systems
- Safety Code of Practice for Ammonia Refrigerant R717 – Institute of Refrigeration
- GBT9237-2017 Standard for Safety and Environmental Requirements for Refrigeration Systems and Heat Pumps

M2.2: Ozone depletion potential

Refrigerants that contain neither chlorine nor bromine will have an ozone depletion potential (ODP) of zero. Zero-ODP options include, but are not limited to, the following classifications:

1. Natural Fluids & Inorganics

- Air
- Water (R-718)
- Carbon dioxide (R-744)
- Ammonia (R-717)
- Lithium bromide

2. Pure Hydrofluorocarbons (HFCs)

- R-32 (Difluoromethane)
- R-125 (Pentafluoroethane)
- R-134a (Norflurane)
- R-143a (Trifluoroethane)
- R-152a (Difluoroethane)

3. Pure Hydrofluoroolefins (HFOs)

- R-1234ze
- R-1234yf

4. Hydrocarbons (HCs)

- R-170 (Ethane)
- R-290 (Propane)
- R-600 (Butane)
- R-600a (Isobutane)
- R-1270 (Propene)
- R-290/R170 (Hydrocarbon Blend)

5. Standard HFC & HFO Blends

- R-404A
- R-407C
- R-410A
- R-413A
- R-417A
- R-454B
- R-507A
- R-513A

M3: Impact of refrigerants

The following information must be entered into the BREEAM Platform for each refrigeration system:

- Refrigeration system type
- Maximum cooling or heating output (kW rating)
- Refrigerant type
- Refrigerant charge (kg)

The following system specific information should also be entered or confirmed in the BREEAM Platform, where it is available:

- Annual leakage rate (% refrigerant charge)
- Annual purge release factor (% refrigerant charge)
- Annual service release (% refrigerant charge)

If this information is not available, default values will be used based on the system type.

The most appropriate system type must be selected from the following list.

- Cold storage and display systems: Integral cabinets
- Cold storage and display systems: Split/condensing units
- Cold storage and display systems: Centralised
- Industrial cold storage
- Air conditioning systems: Unitary split
- Air conditioning systems: Chillers
- Air conditioning systems: Heat pumps

Where more than one air-conditioning or refrigeration system is installed in the building, relevant technical data for each system must be entered in the BREEAM Platform.

Where a system uses several different refrigerants (for example, a primary refrigerant and a secondary coolant, or a cascade), then relevant technical data for each type of refrigerant used must be entered into the BREEAM Platform.

Where the refrigerant system provides heating and cooling (reversible heat pump), the highest kW output value should be entered into the BREEAM Platform.

The BREEAM Platform automatically calculates the number of credits achieved based on the information entered.

M3.1: Global warming potential

The global warming potential (GWP) data for refrigerants is included in the BREEAM Platform and is used to determine systems which meet the GWP limit.

Refrigerants with a GWP of less than 10 $kgCO_2e/kg$ are shown in Table 105 below.

Table 105: Refrigerants with a GWP of less than 10 $kgCO_2e/kg$

Refrigerant	GWP, $kgCO_2e/kg$
R718 = water	0
R717 = ammonia	0
R600 = butane	0.006
R290 = propane	0.06
R170 = ethane	0.437
Carbon dioxide (R744)	1
R1234yf*	1
R1234ze*	1
R1270 = propene	2
R600A = isobutane	3
HFC-161	4
R601 = pentane	5
R601A = isopentane	5
* There is no specific figure available, however it is known that the GWP factor is < 1 $kgCO_2e/kg$	

M3.2: Direct effect life cycle (DELC) carbon dioxide equivalent

This measures the global warming arising from fugitive refrigerant gas leakage over the lifetime of the system in $kgCO_2e$ and is calculated automatically in the BREEAM Platform based on information entered about the installed refrigeration systems.

M4: Leak detection

M4.1: Leak detection – Benign refrigerants

Systems that use only environmentally benign refrigerants are exempt from the requirement to install automated leak detection hardware. The following refrigerants are considered environmentally benign:

- Air
- Water (R-718)
- Carbon dioxide (R-744)
- Ammonia (R-717)
- Propane (R-290)
- Butane (R-600)
- Lithium bromide (R-600a)
- Solid refrigerants (including thermoelectric and caloric cooling systems)

M4.2: Leak detection – Permanent automated refrigerant leak detection system

The tonnes of carbon dioxide equivalent for a system are calculated by multiplying the refrigerant mass by the refrigerant's GWP.

To qualify for this issue, the leak detection system must:

- Be a permanent installation
- Continuously monitor the atmosphere in the vicinity of refrigeration equipment
- Be calibrated to detect the refrigerant gases in the installed system(s)

— Raise an alarm when a pre-set level of refrigerant is detected.

— Have undergone testing against an appropriate standard

Appropriate standards for testing include:

— Performance of portable locating leak detectors and of fixed gas detectors for all refrigerants EN 14624:2020

— ANSI/ASHRAE Standard 15-2022 Safety Standard for Refrigeration systems

— IEC 60335-2-40 Edition 6

Note: A system that uses pressure changes to detect leaks is not necessarily compliant, as natural pressure fluctuations can occur during normal operation. To be deemed compliant this type of leak detection system would need to monitor the refrigerant pressure and the operating conditions to address the problem of natural fluctuation to prevent false alarms.

M4.3: Leak detection – Isolating and containment the remaining refrigerant charge

Examples of a system which could meet the leak isolation and containment requirements include:

— Systems that initiate an automated shut down and pump down of the refrigerant into a separate storage tank.

— Systems that send an alarm to a facilities manager or an engineer to facilitate manual system shutdown and isolation of the refrigerant charge.

Compliance notes

None.

Evidence

Criteria	Interim design stage	Final post-construction stage
All	Letter from M&E engineer or specification document confirming the absence of refrigerants in the development. OR Relevant section or clauses of the building specification or contract or letter of confirmation from the M&E engineer. AND Where specified, manufacturer's literature or data sheets confirming the relevant refrigeration type and system information.	Assessor's site inspection report and photographic evidence. Final construction drawings or equivalent. Manufacturer's product details confirming data for installed systems. Evidence to show that systems are installed in line with the relevant safety standards.
Prerequisite (2-3)	Confirmation of compliance with the standards or codes of practice required to meet the prerequisite should be provided by the relevant members of the project team, i.e. the system designer and/or the system installer, as appropriate. This recognises the responsibilities of those designing and installing the system configuration. Evidence from the manufacturer is not required.	No further actions required post-construction.

Definitions

Direct effect life cycle (DELC) carbon dioxide equivalent

DELC is a measure of the effect on global warming arising from emissions of refrigerant (in the case of this BREEAM assessment issue) from the equipment to the atmosphere over its lifetime (units: $kgCO_2e$). The calculation involves estimating the total refrigerant release whilst the refrigerant system is in operation and converting this to $kgCO_2e$.

The direct effect life cycle $kgCO_2e$ emissions (DELC) per kW of cooling and heating capacity is calculated within the BREEAM Platform using the following equation:

$$\frac{[RLO + RLSR] \times GWP}{CC}$$

where:

Refrigerant loss operational (RLO) = $(Ref_{charge} \times Sys_{op\text{-}life} \times (L1 + L2 + S1 + S2))/100$

Refrigerant loss system retirement (RLSR) = $Ref_{charge} \times (1 - Ref_{RecEff}/100)$

and where:

1. Ref_{charge} = Refrigerant charge (kg)
2. $Sys_{op\text{-}life}$ = System operational lifetime (years)
3. Ref_{RecEff} = Refrigerant recovery efficiency factor (%)
4. L1 = Annual leakage rate (% refrigerant charge)
5. L2 = Annual purge release factor (% refrigerant charge)
6. S1 = Annual service release (% refrigerant charge)
7. S2 = Probability factor for catastrophic failure (% refrigerant charge loss/year)
8. GWP = Global warming potential of refrigerant
9. CC = Cooling or heating capacity (kW)

Global warming potential (GWP)

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

Green lease

A green lease is a contract that includes additional clauses which provide for the management and improvement of the environmental performance of a building by both owners and occupiers. To be acceptable for BREEAM a green lease agreement must cover all relevant BREEAM requirements and must be signed by both the lessor and the lessee or, where the lessee is unknown, a commitment must be provided by the client that the green lease agreement will be implemented when the building is let.

Hermetically sealed systems

In a hermetically sealed system all refrigerant containing parts are made tight by welding, brazing or a similar permanent connection which may include capped valves and capped service ports that allow proper repair or disposal and which have a tested leakage rate of less than three grams per year. This results in the risk of a large refrigerant leak due to system failure being minimised.

Industrial process

An industrial process is a procedure that involves chemical, physical, electrical, or mechanical steps and is used to manufacture items and is usually carried out on a very large scale.

Ozone depletion potential (ODP)

Ozone depletion 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).

Refrigerant gases

There are three main classes of refrigerants:

1. 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 the earth's ozone layer.
2. 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.
3. Chlorofluorocarbon refrigerants (CFCs) contain chlorine, fluorine and carbon. These refrigerants carry high amounts of chlorine so they are known to be the most hazardous to the ozone layer.

The use of CFCs and HCFCs as refrigerants has been addressed under the Montreal Protocol. Phase out programmes have been agreed resulting in these substances no longer being used as refrigerants in all new installations and most existing situations. The industry's favoured replacements are currently HFCs which are often potent global warming contributors. 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.

Refrigerant leak detection

An automated permanently installed multi-point sensing system, designed to continuously monitor the atmosphere in the vicinity of refrigeration equipment and, in the event of detection, raise an alarm. The system may be aspirated or have multiple sensor heads linked to a central alarm unit or BMS. Various sensor types are available including infrared, semiconductor, or electro-chemical.

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.

Many countries around the world classify refrigerants and refrigerating oil as controlled or hazardous waste and regulate their transport, storage, transfer, and disposal.

Refrigerant recovery

The process of removing refrigerant from a system and storing it in an airtight container.

Small self-contained appliances

These include domestic scale fridges and freezers and individual display cabinets (for example, drinks cabinets in retail shops).

Additional information

DELC calculations

The formula used to calculate the direct effect life cycle CO_2e emissions in BREEAM is based on the Total Equivalent Warming Impact (TEWI) calculation method for new stationary refrigeration and air-conditioning systems. TEWI is a measure of the global warming impact of equipment that takes into account both direct emissions (as assessed in this BREEAM issue) and indirect emissions produced through the energy consumed in operating the equipment (which is assessed in the BREEAM energy section).

For further details, see EN 378-1[82] and the British Refrigeration Association's (BRA) Guideline Methods of Calculating TEWI.

Safe use of HCFC alternatives

The United Nations Environment Programme (UNEP) provide information about the management and phase out of HCFCs and alternatives to HCFCs in the refrigeration and air-conditioning sector, including in their report *Safe use of HCFC alternatives in refrigeration and air-conditioning*.[83]

Pol 02 Local air quality

(all buildings)

Aim

To contribute to a reduction in local air pollution through the use of no or low-emission combustion plant in the building.

Overview

Assessment type	Credits available	Minimum standards	Applicable assessment criteria
Part 1: Fabric and structure	0	None	Not applicable
Part 2: Core services	3	None	All
Part 3: Local services	3	None	All (scope dependent, see ref 1.0)
Part 4: Interior design	0	None	Not applicable

Assessment type specific notes

Ref	Assessment type specific note
1.0	**Part 3: Local services** Local services are defined as systems that supply a specific area only, such as a local heating or cooling unit or a point-of-use water heater. Where heating, cooling, or hot water demand is met by a centralised building system (i.e. core services), this issue is not applicable under Part 3 assessments.

Building type specific notes

Ref	Building type specific note
-	None

Assessment criteria

Up to three credits – No or low emission combustion plant

Three credits – No installed combustion plant

1 All space heating and domestic hot water are supplied by non-combustion systems on-site.

Up to two credits – Low-emission combustion plant

2 Emissions from all installed combustion plant that provide space heating or domestic hot water do not exceed the levels set in Table 106 below.

Table 106: Credits awarded based on NO_x emission levels (mg/kWh) by population density

Maximum mg NO_x/kWh fuel input in terms of gross calorific value (GCV)		Credits
Low population locations	High population locations	
56	27	1 credit
27	24	2 credits

Methodology

M1: Low-emission combustion plant

All items of installed combustion plant that burn either fossil fuel or biomass derived fuels must meet the NO_x emission limit for credits to be awarded.

M1.1: Determining population density

Population density is the number of people per unit of geographic area. It is calculated by dividing the total population of an area by its total land area in people per square kilometre, per hectare or per square mile.

For this issue:

- Low population density is defined as less than 1000 people per square kilometre.

A searchable population density dataset – Human Population Density (Global - Annual - 1 km) – is available from the Food and Agriculture Organization of the United Nations.

M1.2: Determining NO_x emission levels

NO_x emissions must be from manufacturers' data, for example, under the requirements of the Ecodesign Directive 2009/125/EC.

NO_x emissions for all heat sources should be measured under normal operating conditions, which are when all heat sources from the building plant operate to their maximum design heat outputs to meet the building's heating demands.

Where the plant is designed to operate below maximum capacity, for example, multiple or modular systems or standby boilers, the emissions should still be calculated for the plant operating to meet the building's heating demand.

Where manufacturer's data cannot be obtained in mgNO_x/kWh fuel input in terms of GCV on a dry basis the following conversions may be applied:

- Data provided in mg/m³ multiply by 0.859
- Data provided in ppm/kWh multiply by 1.76
- Data provided as mg/MJ multiply by 3.6
- Data provided on a wet NO_x basis multiply by 100/(100-%water vapour)
- Data provided at 3% excess oxygen multiply by 1.17
- Data provided at 6% excess oxygen multiply by 1.4
- Data provided at 15% excess oxygen multiply by 3.54

Compliance notes

Ref	Terms	Description
CN1	Back-up space or water heating systems	Back-up space or water heating systems that will only be used in emergency systems can be excluded from the assessment.
CN2	Open flues	No credits may be awarded for open flue heating or hot water systems.
CN3	District heating	Where a project is connected to a district heating system which is outside the scope of the project or the wider development (e.g. phased developments), the system does not need to be included in the assessment. This is on the basis that the design team do not have control over the specification of the system. Where the design team do have control over the specification of the system, then it must be assessed, and all combustion plant must meet the limits.
CN4	New build extensions to existing building	If the heating or hot water demand for the new extension is being met by an existing system, then the emission levels for the existing system must be assessed against the criteria for this issue.

Evidence

Criteria	Interim design stage	Final post-construction stage
1	Design drawings, relevant sections of the building specifications or contract clauses that identify all heat-generating equipment for space heating and domestic hot water in the building.	Final construction or equivalent drawings or equipment schedules that identify all heat-generating equipment for space heating and domestic hot water in the building. OR Assessor's site inspection report and photographic evidence showing the installed equipment.
2	Design drawings, relevant section of the building specification or contract clauses confirming either: Commitment to meet maximum NO_x ratings for heat generators. OR Where known, details of specified plant and supporting manufacturer's product data sheets. For low population areas, evidence to support population density.	Final construction or equivalent drawings or equipment schedules that identify all heat-generating equipment for space heating and domestic hot water in the building. Manufacturer's product data sheets for installed systems. Documentary evidence to support the installation of the specified equipment such as: Assessor's site inspection report and photographic evidence. OR Copies of purchase orders, invoices or delivery tickets.

Definitions

Gross calorific value (GCV)

The total amount of heat energy released when a substance undergoes complete combustion in oxygen. This is sometimes referred to as the higher heating value. See also, net calorific value (NCV).

Net calorific value (NCV)

The amount of heat energy released when a substance undergoes complete combustion in oxygen minus heat used to vapourise the water that is generated during the combustion process. This is sometimes referred to as the lower heating value. See also, gross calorific value (GCV).

NO_x emissions

This refers to the nitrogen oxide gases – nitric oxide and nitrogen dioxide – that are produced when fuel is burned. NO_x is a major source of air pollution.

Additional information

None.

Pol 03 Minimising watercourse pollution

(all buildings)

Aim

To protect natural watercourses from pollution through effective surface water management and contamination control measures.

Overview

Assessment type	Credits available	Minimum standards	Applicable assessment criteria
Part 1: Fabric and structure	1	None	All
Part 2: Core services	0	None	Not applicable
Part 3: Local services	0	None	Not applicable
Part 4: Interior design	0	None	Not applicable

Assessment type specific notes

Ref	Assessment type specific note
-	None

Building type specific notes

Ref	Building type specific note
-	None

Assessment criteria

Prerequisite – Appropriate consultant

1 An appropriate consultant is appointed to carry out and demonstrate the development's compliance with all criteria.

One credit – Minimising watercourse pollution

2 There is no discharge from the developed site for rainfall up to 5 mm (confirmed by the appropriate consultant).

3 **Low-risk areas:** Pollution prevention must be provided through the use of appropriate sustainable urban drainage systems, based on a robust water quality risk assessment that is proportionate to the hazard and sensitivity of the receiving waters.

4 **High risk areas:** For land uses with a higher risk of contamination or spillage (e.g. petrol, oil, chemicals), the sustainable urban drainage systems must include proprietary treatment products (e.g. oil separators, vortex flow separators) or equivalent. These must be supported by evidence of performance that is acceptable to regulators and maintained for the lifetime of the development.

5 **Chemical or liquid gas storage:** Where such areas are present, the site drainage must include containment measures (e.g. shut-off valves, bunding, or equivalent). The design must also mitigate the risk of sediments and chemicals being remobilised during higher flow events, with measures retained in sustainable urban drainage systems as far as practicable.

6 A management and maintenance plan has been made available to building and site occupiers. The plan should include relevant maintenance agreements for the ownership, long term operation and maintenance of all specified sustainable drainage systems, it should also include a comprehensive drainage plan.

Methodology

M1: Appropriate consultant

An appropriate consultant must be appointed to carry out the water quality risk assessment and demonstrate compliance with all criteria.

The consultant should have qualifications and experience relevant to:

— Designing and reviewing sustainable drainage systems.

— Assessing and preventing watercourse pollution, including sustainable drainage treatment levels and water quality risk assessment.

Where complex flooding or hydrological calculations are required, the consultant must be a specialist hydrological engineer.

The consultant's role is to apply professional judgment in determining the most appropriate pollution prevention strategy for the site. This ensures that the proposed sustainable drainage system and other measures are proportionate to the scale of the project, site conditions, and sensitivity of receiving waters.

The appropriate consultant for the water quality risk assessment may be the same individual as the consultant appointed for Rsl 05, provided they can demonstrate competence in both flood risk and water quality risk assessment.

M2: No discharge for the first 5 mm of rainfall

Developments must be designed so that there is no discharge from the site for the first 5 mm of rainfall.

This requirement reflects the "first flush" principle: the initial 5 mm depth of rainfall typically carries the highest concentration of pollutants (oils, silt, heavy metals) washed off hard surfaces, and must therefore be retained and treated on-site.

Compliance must be confirmed by the appointed consultant through hydrological calculations, modelling, or equivalent evidence.

M2.1 Partial discharge

In a small number of cases, it may not be possible to prevent the first 5 mm from leaving the site completely. In such cases, the consultant must design the system to meet the intent of this criterion as far as possible and provide written justification. Where this can be justified, the credit may still be awarded if all other criteria are achieved.

M2.2 Pipe solutions

End-of-pipe sustainable drainage features, such as ponds and basins will only comply where the principal control for the first 5 mm is achieved through source control (e.g. green roofs, permeable paving, soakaways) or site control methods

M2.3 Green roofs

Green roofs can be deemed to comply with this requirement for rain falling on their surface. However, evidence must still be provided to show that rainfall from all other hard surfaces is being managed to meet the 5 mm criterion.

M3: Pollution prevention in low-risk areas

In low-risk areas (e.g. roofs, small car parks), pollution prevention must be provided through the use of appropriate sustainable drainage techniques, based on a robust water quality risk assessment.

The assessment must be proportionate to the pollution hazard and the sensitivity of receiving waters.

The aim is to ensure that even low-risk surfaces are managed to reduce sediment, oil, and other contaminants before discharge.

The appointed consultant should apply professional judgment to determine the most appropriate strategy for minimising watercourse pollution. The strategy must demonstrate that the level of SuDS treatment is consistent with the risk assessment and site context.

M3.1 Sustainable drainage treatment levels

An approach to drainage design that combines a sequence of appropriate surface water drainage structures using sustainable drainage treatment systems for management of the run-off to treat the flow, reduce run-off volume and restrain the run-off rate in order to minimise man's impact on the environment. Additional benefits associated with operations and maintenance, ecology, and amenity are considered when designing a management system. The management train incorporates a hierarchy of techniques:

1. Source control. Examples of sustainable drainage features include:
    - Soakaways
    - Porous or pervious paving
    - Roof water directed to garden (rather than piped drains)
    - Rainwater reuse
    - Green roofs
    - Other surface infiltration, attenuation and conveyance techniques that deal with run-off at source
2. Site or local control. Examples of sustainable drainage features include:
    - Swales
    - Pond
    - Infiltration basins
    - Detention basin
    - Larger soakaways
    - Pervious (porous or permeable) paving
3. Regional control. Examples of techniques include:
    - Balancing ponds
    - Wetlands
    - Large detention basin

Each component should be selected to provide effective treatment before discharge at the site boundary.

Treatment levels

- The “level of treatment” is determined by the number of sustainable drainage features in series through which run-off passes.
- Where a single sustainable drainage feature provides multiple treatment processes, it may count as more than one level of treatment.
- The consultant must confirm that the chosen level of treatment is appropriate to the level of risk and sensitivity of receiving waters.

M4: Pollution prevention in high-risk areas

For high-risk areas (e.g. vehicle manoeuvring areas, car parks, waste disposal facilities, delivery and storage yards, or plant areas), the sustainable drainage treatment levels must incorporate proprietary treatment products (such as oil separators, vortex flow separators, or equivalent).

These systems must be supported by independent performance evidence acceptable to regulators and be designed for long-term maintenance.

M4.1 Areas that are a source of pollution

High-risk areas include, but are not limited to:

- Vehicle manoeuvring areas and car parks
- Waste disposal facilities
- Delivery and storage facilities
- Plant areas

M4.2 Permeable paving systems

Where a permeable paving system is designed to retain silts and degraded oils, this can be deemed compliant with the pollution prevention requirements for car parks and access roads.

Oil separators

- Class 1 separators: Designed to achieve < 5 mg/l oil, suitable for small droplets (e.g. car park run-off).
- Class 2 separators: Designed to achieve < 100 mg/l oil, suitable for larger spillages or lower quality requirements.
- Separators can be:
  - Full retention (treat full system flow, normally rainfall of 50 mm/hr).
  - Bypass (treat flows up to 5 mm/hr rainfall; higher flows bypass).
- The appropriate type of separator must be specified based on the pollution hazard level and local regulatory requirements.

M5: Chemical or liquid gas storage

Where chemical or liquid gas storage areas are present, the site drainage system must incorporate containment measures to prevent polluting substances entering watercourses or sewers.

Acceptable containment measures may include:

- Shut-off valves
- Bunding
- Isolation chambers or equivalent protective systems

The drainage design must also address the risk of sediments and chemicals being remobilised during higher flow events, with measures retained in the SuDS as far as practicable.

M5.1 Roof plant

Roof-top plant spaces must also be considered where polluting substances (e.g. fuel, oil, hydraulic fluids) are present.

In such cases, appropriate containment must be designed into the roof drainage system.

Refrigerant-only units are excluded, as their pollution risk relates to air rather than water.

M6: Drainage and maintenance plan

A management and maintenance plan must be prepared and made available to building and site occupiers.

The plan must include:

1. A comprehensive drainage layout, clearly showing sustainable drainage features, discharge points, containment systems, and treatment components.
2. Maintenance agreements setting out roles and responsibilities for ownership, long-term operation, and maintenance of all sustainable drainage features and treatment systems.
3. A maintenance schedule, specifying frequency and method of inspection, cleaning, and replacement of key components.
4. Emergency procedures for containment systems (e.g. shut-off valves, bunds) in case of accidental spills.

M6.1 Extension or infill sites

For infill or extension developments, the pollution prevention criteria apply to:

1. All areas within the construction zone that present a pollution risk.

2. Any external areas affected by the new works, including drainage onto or from the proposed development.

M6.2 No watercourses present

This credit must be assessed even if no watercourses are located nearby. The aim is to minimise pollution by controlling the discharge of potentially contaminated run-off into public sewers, not only natural watercourses.

Compliance notes

None.

Evidence

Criteria	Interim design stage	Final post-construction stage
Prerequisite		
1	Appointment of an appropriate consultant and confirmation they are qualified in line with the definition.	Evidence to show an appropriate consultant was appointed.
Minimising watercourse pollution		
2	Calculations and confirmation from the appropriate consultant to demonstrate that there will be no discharge from the site for rainfall up to 5 mm.	Assessor's building or site inspection and photographic evidence. AND EITHER Written confirmation from the developer or suitably qualified consultant that the solutions assessed at the design stage have been implemented. OR Where the design has changed, the evidence identified for the design stage assessment is provided for post-construction or final construction details.
3–5	Design drawings or relevant section or clauses of the building specification or contract indicating: 1. High and low risk areas of the site. 2. Specification of sustainable drainage system or SuDS, source control systems, oil or petrol separators and shut-off valves as appropriate.	Assessor's building or site inspection and photographic evidence. AND EITHER Written confirmation from the developer or suitably qualified consultant that the solutions assessed at the design stage have been implemented. The statement should also confirm that the measures will be able to perform their function for the entire lifetime of the development. OR Where the design has changed, the evidence identified for the design stage assessment is provided for post-construction or as-built details.
6	Relevant section or clauses of the building specification or contract. OR Letter of commitment.	Letter of confirmation. As-built drainage plan. Evidence to confirm that maintenance responsibilities have been defined for any SuDS solutions installed.

Definitions

Discharge point

The discharge point is the point at which the run-off from the site leaves the site boundary and enters a watercourse.

Hard surfaces

These include roofs, car parks, access roads, pavements, delivery and service yards and external hard landscaping. Footpaths less than 1.5 m wide which have free drainage to soft landscaped areas on both sides may be excluded.

Infiltration

The passage of water into a permeable surface, such as soil, permeable paving and soakaways.

Low-risk areas (with respect to watercourse pollution)

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 issue, roofs and small car parks may be considered as low-risk areas.

Rainwater discharge

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

Roof plant

Mechanical or electrical equipment installed on the roof—such as generators, fuel or oil tanks, transformers, hydraulic machinery and associated pipework—that contains liquids or other substances capable of contaminating runoff. Refrigerant-only units are excluded, as their primary pollution pathway is to air rather than water.

Run-off

This is usually rainwater, but can also be groundwater or overspill from sewers and other sources.

Soakaways

A subsurface structure designed to promote the infiltration of surface water into 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; shallow structures providing infiltration in an extensive way (infiltration trenches and permeable paving) do not need oil separators.

Sustainable Drainage Systems

Sustainable Drainage Systems are a sequence of water management practices designed to mimic natural drainage. Unlike traditional piped systems, they manage rainfall at the source to reduce peak flows and run-off volumes, thereby directly mitigating flood risk and improving water quality. Regional perspectives have led to different terms for similar approaches, including:

- SuDS (Sustainable Urban Drainage Systems): Focuses on a multi-stage sequence of control measures (management train) to manage surface water quantity and quality.
- LID (Low Impact Development): Emphasizes site-level micro-controls, infiltration, and other measures to maintain pre-development hydrology and manage run-off sustainably.

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.

Watercourses and sewers

A term that includes rivers, streams, ditches, drains, culverts, dykes, sluices, sewers and passages through which water flows.

Additional information

Biodiversity Net Gain, Urban Greening Factor and sustainable drainage systems

Where sustainable drainage systems are designed with biodiversity in mind, they can contribute to the Biodiversity Net Gain and Urban Greening Factor scores in Lue 04. Close collaboration between sustainable drainage systems specialists/engineers, landscape architects and ecologists will ensure multiple objectives are met for the project.

Pol 04 Reduction of nighttime light pollution

(all buildings)

Aim

To ensure that lighting is concentrated in appropriate areas, minimise upward light, and reduce obtrusive light pollution. This aims to limit unnecessary energy consumption, minimise nuisance to neighbouring properties, and mitigate adverse impacts on transport systems and natural habitats.

Overview

Assessment type	Credits available	Minimum standards	Applicable assessment criteria
Part 1: Fabric and structure	0	None	Not applicable
Part 2: Core services	1	None	All
Part 3: Local services	1	None	All
Part 4: Interior design	1	None	All

Assessment type specific notes

Ref	Assessment type specific note
1.0	**Part 2, 3, 4 – Scope of work** Where a criterion (2, 3, or 4) is not relevant to the scope of a particular part of the RFO, it may be considered not applicable, provided there is justification through design team confirmation.

Building type specific notes

Ref	Building type specific note
-	None

Issue specific notes

Ref	Issue specific note
3.0	**No exterior lighting** Where the assessed project does not include any lighting (external or internal) that illuminates external spaces or façades after dark, this issue is not applicable.

Assessment criteria

One credit – Reduction of light pollution

1 Light pollution has been eliminated through effective design that removes the need for artificial lighting at night. This does not adversely affect the safety and security of the site and its users.

OR alternatively, where the building does use artificial lighting at night, one credit can be awarded as follows:

2 The lighting strategy has been designed to reduce obtrusive light. This includes both external lighting and internal lighting in spaces with glazed apertures.

3 A curfew is established for all external lighting (except for safety and security lighting), which is automatically switched off between 23:00 and 07:00.

4 Illuminated advertisements are designed to control brightness and minimise visual disturbance during nighttime hours.

5 Lighting is designed to minimise impacts on nocturnal wildlife.

Methodology

M1: Lighting guidelines

The following guides when and how to apply the criteria to the lighting associated with a building being assessed.

1. **Assessment scope:** Where the assessment concerns a refurbishment or fit-out within an existing building or site, only those areas where lighting is being newly installed, replaced, or significantly modified as part of the works need to be assessed. Where the assessment concerns a refurbishment forming part of an entirely new development, the criteria apply site-wide.
2. **Assessment of extensions:** Extensions may form part of the works, but are generally part of a predominantly refurbishment development. In such cases, lighting across all relevant building areas — including the new extension and any refurbished areas — should be assessed where lighting is being installed, replaced, or significantly modified.
3. **Determining lighting types:** The design team and the assessor are responsible for determining which lights are provided for safety and security purposes and which should be considered general lighting. The type of safety and security lighting depends on the project and the location of the lighting.
4. **External areas lit by internally mounted lighting:** 'external lighting' includes both lighting mounted externally and lighting mounted inside a building primarily intended to enhance its external appearance or light external spaces after dark.
5. **Operational hours exemption:** During hours of operation between 23:00 and 07:00, lighting required for operational reasons does not have to be modified for BREEAM compliance.
6. **Exemptions for security purposes:** When specified light fittings adhere to particular security standards that conflict with BREEAM criteria, they may be exempt from assessment in this issue. In such cases, the assessor must procure evidence verifying the specific security standards' applicability to the assessed development. While such security lighting must remain unaffected to ensure safety and security — for example, in a prison building type — all other non-security lighting must meet the light pollution reduction criteria.
7. **Exclusion of flush stud lights:** Flush stud lights used for safety purposes in vehicle manoeuvring areas may be excluded from the assessment. In these circumstances, the assessor must obtain evidence confirming the specific security standards and that they apply to the assessed development.
8. **Illuminated advertisements:** All types of illuminated advertisements, both self-illuminated and those illuminated by reflection from other sources, must meet the criteria.

M2: Reduction of obtrusive light

The lighting strategy design should follow the five sets of recommendations outlined in the following two Commission Internationale De L'Eclairage (CIE) guides, which provide guidance to the mitigation of obtrusive light:

— CIE 150:2017 *Guide on the Limitation of the Effects of Obtrusive Light from Outdoor Lighting Installations*

— CIE 126:1997 *Guidelines for Minimizing Sky Glow*

The five sets of recommendations:

1. Limitation of illumination on surrounding premises
2. Limitation of bright luminaires in the field of view
3. Limitation of the effects on transport systems
4. Limitation of skyglow
5. Limitations of the effect of over-lit building facades and signs

The lighting strategy design must comply with the limits set for light technical parameters in Table 1 to Table 7 of CIE 150:2017 (including their accompanying notes) and Table 2 of CIE 126:1997.

For cut-off type and angled luminaires which (by design) block out light in obstructive directions, calculations are not required for meeting requirements relating to:

— Vertical illuminance (Table 2 of CIE 150:2017), and

— Luminous intensity (Table 3 of CIE 150:2017).

Compliance with the Institution of Lighting Professionals (ILP) GN01/21 for the reduction of obtrusive light ensures alignment with the requirements of CIE 150:2017 and CIE 126:1997. ILP GN01/21 is available free of charge from the ILP website (www.theilp.org.uk).

M3: Setting a curfew

This will normally include floodlighting, signage, and all lighting that is not required for safety or security. Illuminated advertisements may be excluded from this requirement but will need to comply with different levels of maximum luminance depending on the surrounding and background environment (see criterion 4 and M4).

Where safety or security lighting is provided and will be used between 23:00 and 07:00, this part of the lighting system must comply with the lower lighting levels recommended during these hours in Table 2 to Table 7 of CIE 150:2017.

Where a different curfew time applies for other reasons (e.g., noise control), consideration should be given to coordinating the curfews, e.g., allowing sufficient time of operation for the lighting after the conclusion of the activity to facilitate crowd dispersal, particularly where large numbers of spectators are involved.

M4: Illuminated advertisements

The principles outlined in CIE 150:2017 and CIE 126:1997 should be applied to external and internal outward facing illuminated advertisements, including digital displays

The maximum luminance values depend on the building's location (see Table 107 below).

Table 108 below outlines the maximum luminance (cd/m²) permitted at any point on the surface of an illuminated advertisement during nighttime hours.

Table 107: Environmental lighting zone

Zone	Surrounding	Lighting environment	Examples
E0	Protected	Dark	Astronomical observable dark skies, UNESCO starlight reserves, IDA dark sky places
E1	Natural	Dark	National parks or protected sites, areas of outstanding natural beauty, relatively uninhabited rural areas
E2	Rural	Low district brightness	Sparsely inhabited rural areas, village or relatively dark outer suburban locations
E3	Suburban	Medium district brightness	Well inhabited rural and urban settlements, small town centres of suburban locations
E4	Urban	High district brightness	Town centres and commercial districts with high levels of nighttime activity

Table 108: Recommendations for maximum nighttime permitted values of display luminance (cd/m²), adapted from PLG05

Illuminated area (m²)	Zone E0	Zone E1	Zone E2	Zone E3	Zone E4
0 to < 5	0	25	200	300	300
5 to < 20	0	0	200	300	300
≥ 20	0	0	100	200	300

The values in Table 108 apply to pre-curfew. The post-curfew levels shall generally be the display being off, unless (in Zone E2 to Zone E4 inclusive) the installation is still required to be operational, in which case the performance level should be 50% of the pre-curfew level.

The values in Table 108 do not apply to signs for traffic control purposes.

M5: Nocturnal wildlife

Assessments must demonstrate how the potential impacts of both external and internal lighting have been considered. This applies according to the project scope, the building or the assessment area. The requirement is relevant where the building is located near ecologically sensitive areas or nocturnal wildlife habitats, as well as in areas where lighting may increase the risk of bird collisions. These considerations cover all nocturnal species, including bats, birds, and other wildlife.

To minimise impacts from unnecessary night-time lighting, the following should be considered:

- **Identify habitats:** Determine the presence or potential for nocturnal wildlife and key habitats and assess their ecological importance.
- **Preserve darkness:** Avoid any lighting on key habitats to maintain complete darkness.
- Apply mitigation measures and sensitive design. For example:
  - Based on habitat value, dark buffers and concentric zonation should be established with appropriate buffer widths and illuminance limits.
  - Selecting suitable luminaires and site configurations.
  - Implementing physical screening to block light spills.

Reducing unnecessary internal and external night-time lighting helps protect nocturnal wildlife. It reduces the risk of bird collisions, particularly for migratory and nocturnal species that rely on natural light cues for navigation. Additional measures for mitigating bird-window collisions are addressed in Lue 03 Managing impacts on ecology.

Compliance notes

Ref	Terms	Description
CN1	Best practices / National and international frameworks	Projects are encouraged to consider best practices, and national and international frameworks that help to address the criteria on this issue. Examples include the International Dark-Sky Association (IDA) which provide universal principles for reducing light pollution. Adhering to these frameworks supports compliance with the criteria and demonstrates a commitment to minimising obtrusive light pollution impacts.
CN2	Maximum luminance	When considering the zone in which an advertising sign is, or is intended to be, sited, the contrast with the surrounding or background should be considered (e.g. the surrounding could be unlit when viewed from the road or a residential window) and the zone adjusted accordingly. Where an illuminated sign lies on the boundary of two zones or can be observed from another zone, the illumination level used should be that applicable to the most rigorous zone.

Evidence

Criteria	Interim design stage	Final post-construction stage
1	Written confirmation from appropriate member of the design team or design drawings to confirm that there is no artificial lighting at night.	Assessor's site inspection report and photographic evidence.
2–5	Relevant section or clauses of the building specification or contract. OR Letter of commitment.	Evidence, including indicative examples, to demonstrate how the installed lighting meets the criteria requirement.

Criteria	Interim design stage	Final post-construction stage
	OR Where available, design drawings and lighting design data or calculations. The M&E engineer or lighting designer must provide indicative examples of where and how the strategy complies with the assessment criteria.	This could include where relevant: — Final construction or equivalent lighting layout drawings. — Lighting calculations. — A statement from the M&E engineer or lighting designer. — Manufacturer's literature for the installed luminaires.

Definitions

Bird collision

The impact of a bird with a building structure, often resulting in injury or death. Collisions commonly occur when birds are disoriented by artificial lighting or cannot perceive transparent or reflective surfaces such as glass façades, particularly during migration or in low-light conditions. Other measures to mitigate bird-window collisions are addressed in Lue 03 Managing impacts on ecology – Reducing bird-window collisions.

Complete darkness

Achieving complete darkness is not feasible in areas where any form of lighting is present. For the purposes of BREEAM, complete darkness is defined as illuminance levels at or below 0.2 lux on the horizontal plane and 0.4 lux on the vertical plane. These thresholds align with recommendations for maintaining suitable conditions for light-averse nocturnal wildlife.

Curfew

A designated time period during which all non-essential external lighting (e.g. general and decorative lighting) is automatically switched off to reduce light pollution.

Dark buffers

Unlit or minimally lit zones established around key habitats to minimise light intrusion.

Environmental lighting zones

Categories defining the surrounding lighting environment, ranging from Zone E0 (Dark/Protected) to Zone E4 (Urban). See Table 107 on page 444.

Illuminated advertisements

An advertisement designed or adapted to be illuminated by artificial lighting, directly or by reflection. It also includes any billboard or similar structure used, designed or adapted for the display of advertisements, including self-illuminated and externally illuminated types.

Nocturnal wildlife habitats

Areas that provide living, breeding, or foraging space for nocturnal species. These may include both ecologically rich sites and areas of lower ecological quality where nocturnal wildlife is active and should be considered.

Obtrusive light

Any light that creates unwanted or excessive illumination beyond the intended area, causing adverse effects such as glare, light trespass, or skyglow.

Additional information

None.

Pol 05 Reduction of noise pollution

(all buildings)

Aim

To reduce the likelihood of noise arising from fixed installations on the new development affecting nearby noise-sensitive buildings.

Overview

Assessment type	Credits available	Minimum standards	Applicable assessment criteria
Part 1: Fabric and structure	1	None	All
Part 2: Core services	1	None	All
Part 3: Local services	1	None	All
Part 4: Interior design	0	None	Not applicable

Assessment type specific notes

Ref	Assessment type specific note
-	None

Building type specific notes

Ref	Building type specific note
-	None

Issue specific notes

Ref	Issue specific note
3.0	**Applicability** This issue applies where the assessed works include existing or newly installed externally mounted plant or where fabric measures could influence noise levels affecting nearby noise-sensitive buildings or spaces.
3.1	**No occupied areas and no noise-generating plant or equipment** Where the assessed area is not intended to be occupied, or where no plant or equipment capable of generating noise is present or specified, the requirements of this issue do not apply. In these situations, the relevant credits should be filtered out, as the issue does not apply to those areas.

Assessment criteria

One credit – Noise level

1 A preliminary noise screening, prepared or verified by a suitably qualified acoustician (SQA), must identify any noise-sensitive receptors within 800 m and assess the risk of significant impact from fixed building services.

2 Where the screening identifies noise-sensitive receptors within 800 m or a potential for significant noise impact, a full noise impact assessment must be undertaken in accordance with BS 4142:2014+A1:2019 (UK) or ISO 1996 series (International).

3 Where a full noise impact assessment is required, it must be measured or determined for:

3.a Establish existing background noise levels:

3.a.i At the nearest or most exposed noise-sensitive receptor to the proposed assessed development or at a location with demonstrably similar background conditions.

3.a.ii Include measurements of the existing plant on a building, where the assessed development is an extension to the building.

3.b Determine predicted sound level contribution from the assessed building, including all fixed building services and any predictable external activities (see M1 and M2).

4 The noise impact assessment must be carried out by an SQA holding a recognised acoustic qualification and membership of an appropriate professional body (see Definitions).

5 The assessed building's noise contribution must be at least 5 dB below the existing background sound level, at the nearest or most exposed noise-sensitive receptor, during day and night.

5.a **BS 4142:** The compared parameter must be the Rating Level (LAr,Tr), including all applicable acoustic feature corrections.

5.b **ISO 1996:** The parameter must be the assessed LAeq sound level contribution from the installation.

6 If the 5 dB margin is not met, the SQA must specify attenuation measures (e.g. enclosures, barriers, or controls) to achieve compliance.

Methodology

M1: Noise level measurements at the design stage

At the design stage assessment, when noise-sensitive receptors are present, actual measurements may not be feasible due to the absence of the planned installation. In such scenarios, compliance can be demonstrated through acoustical calculations or scale-model predictions.

In accordance with ISO 1996-2:2017 and BS 4142:2014, where direct measurement of ambient noise is impractical or unrepresentative, sound levels must be estimated using recognised calculation methods. The acoustic report must clearly document the calculation approach, input data, and justification for its use.

If no reliable prediction method is available, measurement is required using either:

— A comparable existing noise source, or

— The actual installation is once operational.

Where the latter approach is used (post-installation measurement), the project team must provide a written commitment to:

— Appoint an SQA to carry out post-installation measurements, and

— Implement additional attenuation measures if the resulting Rating Level (or LAeq contribution) does not meet the 5 dB margin below background required by criterion 5.

M2: Noise level measurements post-construction stage

Post-construction noise measurements are not required where the SQA has:

1. Accurately modelled the Rating Level (LAr,Tr) or LAeq contribution using the manufacturer's data and verified site measurements of the background sound level taken at the design stage.
2. Confirmed that all specified attenuation measures have been installed as designed.

If modelling cannot be verified, on-site measurements by the SQA are required to demonstrate the 5 dB threshold is met. Compliance depends on the verified installation of the SQA's recommended measures.

Compliance notes

Ref	Terms	Description
CN1	Natural ventilation	Where the assessment area is designed to use natural ventilation, a separate

Ref	Terms	Description
		acoustics report is not required. As natural ventilation does not introduce significant noise, the Pol 05 credit can be awarded by default.
CN2	Untreated buildings (e.g. industrial warehouse storage)	This issue does not apply where internal spaces are not serviced by heating, ventilation or air-conditioning systems, and the building does not have noise-generating plants or equipment.
CN3	Standard not appropriate or not applicable	Where a suitably qualified acoustician confirms that ISO 1996:2007 is not an appropriate standard of assessment for the proposed building or site, their assessment of the likelihood of complaints from noise impact can be accepted for the purpose of assessing this issue.
CN4	National or local alternative to ISO standard	It is possible to use a national or local equivalent to the ISO 1996 series; however, this must be approved by BRE Global. The Approved Standards list can be used to check for previously approved standards or to propose a new national or local standard.
CN5	No external plant specified	Where no external plant is specified but occupied areas are present, the project must provide a formal statement from a suitably qualified acoustician confirming that: — There are no significant noise sources associated with the project, and — The proximity of any noise-sensitive receptors has been reviewed. The statement must justify the approach and confirm that the aim of the issue is met.
CN6	Temporary power solutions in noise impact assessments	Plants such as standby generators that are only used temporarily are excluded from the noise impact assessment.
CN7	Low background sound levels	Where background sound levels are low (e.g. at night), no flexibility applies. The criteria, including the required 5 dB reduction, remain valid. The aim is to limit noise impact on sensitive receptors, and the SQA confirms the requirements are appropriate even in quiet environments.

Evidence

Criteria	Interim design stage	Final post-construction stage
1	Design drawings highlighting: 1. All existing and proposed noise-sensitive buildings local to, and within, the site boundary. 2. Proposed sources of noise from the project. 3. Distance (m) from these buildings to the assessed development.	Updated evidence to confirm no noise-sensitive areas or buildings within an 800 m radius of the assessed site. Assessor's site inspection report and photographic evidence.
2–5	The acoustician's noise impact assessment report and evidence to verify the acoustician's qualifications and professional status. AND Commitment to complete post-construction testing. OR Relevant sections of the building specification, contract clauses or letter of commitment requiring a compliant noise assessment to be carried out by a suitably qualified acoustician.	Updated acoustician's report confirming compliance with ISO 1996 / BS 4142:2014 and measured or modelled noise levels from installed plant. Evidence to verify the acoustician's qualifications and professional status. Where relevant, manufacturer's details and final construction drawings or equivalent showing the installed plant. Assessor's site inspection report and photographic evidence.
6	Acoustician's report with recommendations for noise attenuation measures. AND EITHER A marked-up design plan highlighting the	Assessor's site inspection report and photographic evidence confirming the existence of the specified noise attenuation measures.

Criteria	Interim design stage	Final post-construction stage
	specification of the acoustician's attenuation measures. OR A formal letter from the client or design team confirming where relevant, that attenuation measures recommended by an appointed suitably qualified acoustician will be installed.	OR A letter from the acoustician confirming that all specified attenuation measures have been installed to the required standard. OR Manufacturer's details and final construction drawings or equivalent showing installed attenuation measures.

Definitions

Noise-sensitive receptors

Landscapes or buildings where the occupiers are likely to be sensitive to noise created by the new plant installed in the assessed building, including:

1. Residential areas
2. Hospitals, health centres, care homes, doctor's surgeries etc.
3. Schools, colleges and other teaching establishments
4. Libraries
5. Places of worship
6. Wildlife areas, historic landscapes, parks and gardens
7. Located in an area recognised as having outstanding natural beauty, scientific or ecological interest
8. Any other development that can be considered noise-sensitive, as specified by the suitably qualified acoustician.

Suitably qualified acoustician (SQA)

An individual achieving all the following items can be considered to be 'suitably qualified' for the purposes of a BREEAM assessment:

1. Has a minimum of three years relevant experience (within the last five years). Such experience must clearly demonstrate a practical understanding of factors affecting acoustics in relation to construction and the built environment; including, acting in an advisory capacity to provide recommendations for suitable acoustic performance levels and mitigation measures.
2. Holds a recognised qualification in acoustics and membership of an appropriate professional body.

Acousticians that meet the definition of a suitably qualified acoustician in Hea 06a Acoustic performance, will also meet the definition for the purposes of compliance with this issue.

Where an SQA is verifying the acoustic measurements or calculations carried out by another acoustician who does not meet the SQA requirements, they must, as a minimum, have read and reviewed the report and confirm in writing that they have found it to:

1. Represent good industry practice.
2. Be appropriate given the building being assessed and scope of works proposed.
3. Avoid invalid, biased and exaggerated recommendations.

Additionally, written confirmation from the third-party verifier that they comply with the definition of an SQA is required.

Additional information

BS 4142:2014+A1:2019

BS 4142:2014 outlines methods for evaluating and rating industrial and commercial noise that affects nearby residential or noise-sensitive areas. It compares specific sound levels from sources such as building services or plant with existing background noise, including adjustments for tonal, impulsive, or intermittent features, to assess the likelihood of adverse noise impact.

ISO 1996-2:2017

ISO 1996-2:2017 provides guidelines for describing, measuring, and evaluating environmental noise. It includes methods for measuring rating level, assessing noise exposure, and assessing noise's impact on communities. The ISO 1996 standards relate

to noise pollution and its effects on human health and well-being in outdoor environments.

Innovation



Summary

The innovation category provides opportunities for exemplary performance and innovation to be recognised that are not included within, or go beyond the requirements of the credit criteria. This includes exemplary performance credits, for where the building meets the exemplary performance levels of a particular issue. It also includes innovative products and processes for which an innovation credit can be claimed, where they have been approved by BRE Global.

The cost-saving benefits of innovation are fostered and facilitated by helping encourage, drive and publicise accelerated uptake of innovative measures.

Assessment issues

Inn 01 Innovation	up to 10 exemplary

Inn 01 Innovation

(all buildings)

Aim

To support innovation within the construction industry through the recognition of sustainability related benefits which are not rewarded by standard BREEAM issues.

Overview

Assessment type	Credits available	Minimum standards	Applicable assessment criteria
All	10 exemplary	None	All

Assessment criteria

Exemplary level of performance in existing BREEAM issues

1 Where the building demonstrates exemplary performance by meeting defined exemplary level performance criteria in one or more of the following BREEAM assessment issues:

- 1.a Man 03 Responsible construction
- 1.b Man 05 Aftercare
- 1.c Hea 01 Natural light
- 1.d Hea 02 Electric light
- 1.e Hea 04 Indoor air quality
- 1.f Hea 07 Safe and accessible design
- 1.g Ene 01 Energy and carbon performance for regulated energy uses
- 1.h Ene 02 Prediction of operational energy and carbon
- 1.i Wat 01 Water consumption
- 1.j Wat 05 Prediction of operational water consumption
- 1.k Mat 01 Building life cycle assessment
- 1.l Mat 03 Responsible sourcing of construction products
- 1.m Rsl 04 Protection against human error and malicious damage
- 1.n Wst 01 Construction waste management
- 1.o Wst 02 Recycled aggregates
- 1.p Lue 02 Ecological risks and opportunities
- 1.q Lue 04a Ecological change and enhancement

Refer to each assessment issue for details of the exemplary level performance criteria.

Approved innovations

2 One innovation credit can be awarded for each innovation application approved by BRE Global, where the building complies with the criteria defined within an approved innovation application form.

> Up to a maximum of 10 exemplary credits are available in aggregate from a combination of criteria 1 and 2 (with the total BREEAM score capped at 100%).

Methodology

M1: Exemplary level of performance

For information on the methodology for exemplary credits refer to the Methodology section of the relevant BREEAM assessment issues.

M2: Approved innovations

Innovation applications can be submitted to BRE Global by a licensed BREEAM Assessor using the formal approved innovation application form (available from BREEAM Projects).

Evidence

Criteria	Interim design stage	Final post-construction stage
1	As defined within the relevant assessment issues.	As defined within the relevant assessment issues.
2	A copy of the approved innovation application form. AND A copy of the innovation application report stating the application outcome as 'approved'. AND Relevant documentary evidence demonstrating specification of the approved innovation.	As per interim design stage. AND Relevant documentary evidence confirming that the project has achieved or installed the approved innovation as described and quantified within the approved innovation application form.

Definitions

Approved innovation

Any new technology, design, construction, operation, maintenance or demolition method or process that can be shown to improve the sustainability performance of a building and is of demonstrable benefit to the wider industry in a manner that is not covered elsewhere in BREEAM. In addition, the innovation has been approved by BRE Global in accordance with its published BREEAM Innovation credit procedures.

Additional information

Applying for approved innovation credits

For more information on BREEAM Innovation credit eligibility criteria, application process, application fees and previously approved innovations, refer to the BREEAM Innovation section documents available from BREEAM Projects.

Appendices

Appendix A – Asset types and sub-types

Appendix B – How BREEAM Refurbishment works with other BREEAM schemes

Appendix A – Asset types and sub-types

A full list of asset types and sub-types that can be assessed using BREEAM Refurbishment Commercial V7 is given in Table 109 below.

Table 109: List of building types covered under BREEAM Refurbishment Commercial V7

Asset category	Asset type	Asset sub-type
Commercial laboratory	Laboratory (CL 2 or 3) (note 1)	-
Community	Coast guard station or mountain rescue station	-
	Community hub, community centre, day centre	-
	Crematorium	-
	Library	-
	Mortuary	-
	Place of worship	-
	Visitor centre	-
Culture and entertainment	Cinema or movie theatre	-
	Exhibition or conference hall	-
	Museum or art gallery	-
	Performing arts theatre or music hall or concert hall	-
Education	Preschool	Nursery school
		Children's centre
		Crèche or daycare
	School	Primary school
		Secondary school
		All age range school
		K-12 school
		Non-acute special educational needs (and disability) school (SEN/SEND)
	Further education institution	Sixth form school or college
		Vocational college
	Higher education institution	College
		University
Government services	Fire station	-
	Holding centre	-
	Law court	-
	Police station	-
	Prison (UK only)	High security closed prison
		Closed prison
		Open prison
		Youth custody establishment
	Town hall	-

Asset category	Asset type	Asset sub-type
Healthcare	Primary healthcare surgery	-
	Health centre or clinic	-
	Hospital	Acute and maternity hospital
		Community and mental health hospital
		Long stay hospital
		Teaching and specialist hospital
	Ambulance station	-
	Ambulatory surgical centre	-
Hospitality	Hotel (STR) (note 2)	Luxury chain
		Upper upscale chain
		Upscale chain
		Upper midscale chain
		Midscale chain
		Economy chain
	Serviced apartment (STR) (note 2)	Luxury chain
		Upper upscale chain
		Upscale chain
		Upper midscale chain
		Midscale chain
		Economy chain
	Hostel	-
	Guest house	-
Industrial	Manufacturing	General manufacturing
		Light manufacturing
	Logistics	Ambient warehouse
		Temperature-controlled warehouse
	Self-storage facility	-
	Vehicle servicing unit	-
	Film or TV studios	-
Office	Office	-
	Financial office	-
	Veterinary office	-
Residential institution	Long term stay	Co-living
		Key worker accommodation
		Local authority secure residential accommodation
		Military barracks
		Residential care home
		Sheltered housing
		Student accommodation (halls of residence)
	Short term stay	Residential training centre
		Short stay housing units

Asset category	Asset type	Asset sub-type
Retail	Bar, pub, drinking establishment	Bar, pub, drinking establishment (with food service)
		Bar, pub, drinking establishment (without food service)
	Café	-
	Convenience store	-
	Fast food restaurant or takeaway	-
	Restaurant	-
	Retail park or warehouse	-
	Retail services	-
	Retail store	Grocery shop or grocery store
		Specialty store (non-food)
	Shopping centre	-
	Showroom	-
	Supermarket	-
	Wholesale club or supercentre	-
Sports and leisure	Fitness centre or gym	-
	Ice rink	-
	Indoor arena	-
	Leisure centre or recreation centre	Leisure centre or recreation centre (with pool)
		Leisure centre or recreation centre (without pool)
	Stadium (closed)	-
	Swimming pool	Swimming pool (indoor)
		Swimming pool (outdoor)
Transport hub	Rail station (above ground)	-
	Airport terminal	-
	Coach or bus station	-
	Maritime passenger terminal	-
	Tram station	-
Bespoke	Building types that are not listed in this table must undergo a scoping and tailoring exercise to facilitate an assessment and rating. For an individual project this involves BRE Global selecting appropriate issues from the existing pool of assessment issues to provide criteria against which the building can be assessed. This is sometimes known as a 'bespoke' assessment. Further guidance on the 'bespoke' process can be found in Guidance Note 23 (GN23).	

Notes to Table 109
1. CL stands for Containment Level as defined in Management, Design and Operation of Microbiological Containment Laboratories 2018, ACDP.
2. STR stands for Smith Travel Research, an organisation that provides market data for the hotel industry worldwide.

Education building types

BREEAM Refurbishment Commercial V7 can be used to assess the educational establishments mentioned in Table 109. This BREEAM scheme has not been specifically tailored to assess schools for acute special educational needs and disabilities (SEN/SEND).

Acute SEN/SEND refers to children with severe disabilities or learning difficulties that prevent them from interpreting their surroundings without feeling anxious or distressed. These children can become easily distracted or overstimulated, or both. This group of pupils mainly include children with behavioural, emotional or social difficulties (BEDS) and children with communication and interaction disability (autistic spectrum disorder (ASD)).

Acute SEN/SEND schools therefore require a bespoke assessment. Assessors carrying out assessments on schools for pupils with such needs need to consider carefully all the BREEAM issues that might be affected by the need to provide special facilities for these building users (e.g. view out, cyclist facilities, etc). Where criteria in this scheme document are not explicit for this building type, the assessor will need to decide which criteria are appropriate and apply them accordingly, seeking confirmation from BRE Global on the application of alternative building criteria.

For more information on SEN/SEND please refer to the following documents:

— Building Bulletin 102: Designing for disabled children with special educational needs, published by the Department for Children, Schools and Families.

— Building Bulletin 104: Area guidelines for SEND and alternative provision, published by Department for Education.

Healthcare building types

Typical facilities and services offered by and forming part of one of the healthcare buildings are described in Table 110 below. If a healthcare development does not fit with building types outlined in Table 109 on page 456 and Table 110 below, bespoke assessment criteria will be required to assess the project.

Table 110: Typical facilities and services as part of different healthcare buildings

Typical descriptions	Facility	Service
Teaching and specialist hospital, Long stay hospital	In patient High concentration of energy- intensive engineering services and specialist equipment	Diagnostic and treatment services for physical healthcare together with specialist services, Consultant-led
Acute and maternity hospital	Inpatient Medium concentration of energy- intensive engineering services and specialist equipment	Diagnostic and treatment services for physical healthcare, Consultant-led
Community and mental health hospital Learning disability unit	Inpatient Basic engineering services and equipment	Limited diagnostic and treatment services for physical healthcare Nurse- or GP-led, Care services for physical healthcare, Nurse- or GP-led, Mental health and learning disability services, Consultant- or nurse-led
Primary healthcare surgery	Non-inpatient Use typically 50–65 hours per week Basic engineering services and equipment	Primary care consultation GP-led
Health centre or clinic	Non-inpatient Use typically 35–45 hours per week Basic engineering services and equipment	Primary care and mental health Nurse, dental, visiting consultant or specialist

Care homes providing acute care

Care homes providing acute care would typically be assessed under 'Healthcare: Hospital: Acute and maternity hospital'. BREEAM Assessors carrying out assessments on these types of buildings will need to consider carefully all the BREEAM issues that might be affected by the need to provide special facilities for the building users. Where criteria in this scheme document are not explicit for this building type, the assessor will need to decide which criteria are appropriate and apply them accordingly, seeking confirmation from BRE Global on the application of alternative building criteria if necessary.

Appendix B – How BREEAM Refurbishment works with other BREEAM schemes

BREEAM provides a suite of schemes that together assess environmental performance across different stages of a building's lifecycle. The four relevant schemes are:

- **BREEAM New Construction** – assessing the design and construction of new buildings
- **BREEAM Refurbishment** – assessing refurbishment and fit-out works across varying scopes from major refurbishment, upgrades to existing building fabric or services, to the first fit out of newly constructed buildings.
- **BREEAM Fit Out** – assessing tenant or occupier-led fit-out works within existing or newly constructed buildings.
- **BREEAM In-Use** – assessing assets in operation.

These schemes are designed to be complementary, allowing projects to be assessed at each stage of the asset lifecycle in line with the scope of works.

Building delivery scenarios

In shell only developments:

- The base building is assessed under BREEAM New Construction.
- The subsequent first fit out may be assessed against BREEAM Refurbishment using Parts 2, 3 and 4, dependant on the scope of works.
- Where separate tenant fit out is also being carried out, a BREEAM Fit Out assessment may also be used to cover these works.

In shell and core developments:

- The base building is assessed under BREEAM New Construction.
- Subsequent tenant fit-out works may then be assessed using either:
    - BREEAM Refurbishment, where the scope includes modifications to main building services or wider building elements, or
    - BREEAM Fit Out, where works are limited to tenant-controlled interior design and associated local services

In existing buildings undergoing major refurbishment:

- The demolition and refurbishment works are assessed under BREEAM Refurbishment.
- Where required, any subsequent occupier-led fit-out works can be assessed under BREEAM Fit Out, using either Level 1 or Level 2 fit-out depending on the scope.

Figure 4 illustrates how the Refurbishment V7 and Fit Out V7 schemes interact across typical delivery scenarios for the refurbishment and fit out of an existing building.

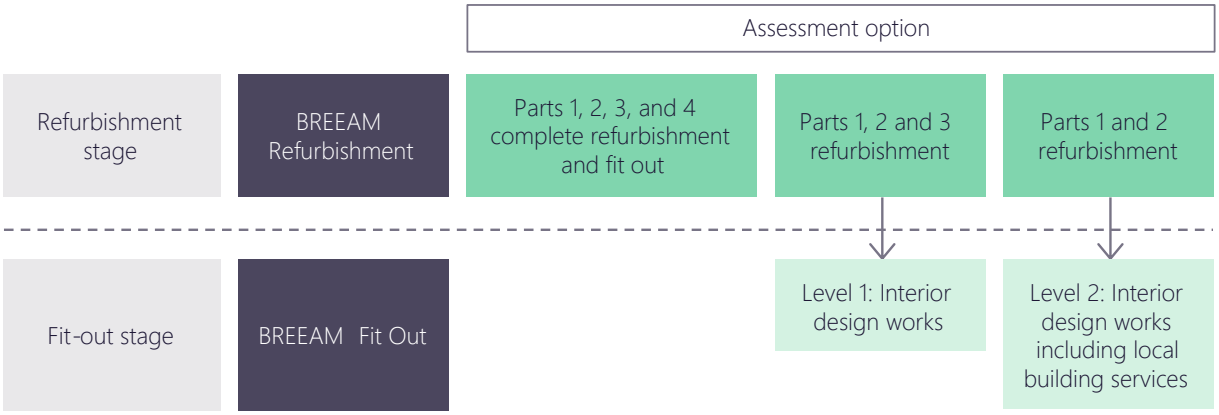


Figure 4: Example assessment options using BREEAM Refurbishment and BREEAM Fit Out on an existing building

Relationship between BREEAM New Construction, BREEAM Refurbishment Parts, and BREEAM Fit Out Levels

The scope of BREEAM New Construction (including Shell only and Shell and core options), BREEAM Refurbishment, and BREEAM Fit Out has been developed with reference to recognised industry definitions, such as the British Council for Offices Category A and B fit-out classifications where applicable. However, in practice, refurbishment and fit out works vary significantly between projects, and no single standard definition applies. This variability is addressed through the multi-part structure of BREEAM Refurbishment and the two levels of certification in BREEAM Fit Out, providing flexibility to tailor the assessment to the specific project scope.

Within **BREEAM Refurbishment**, the multi-part structure also reflects typical New Construction delivery alignments as set out below:

- **Part 1** aligns broadly with shell only.
- **Parts 1 and 2** aligns with shell and core.
- **Parts 1 to 4** aligns with fully fitted buildings.

The **BREEAM Fit Out** scheme broadly aligns with the BREEAM Refurbishment parts as set out below:

- **Level 1** aligns closely with the interior design scope of Part 4.
- **Level 2** aligns with Part 4 together with local services provisions typically associated with Part 3.

This alignment provides flexibility and continuity between schemes while enabling a more streamlined assessment route for fit-out projects, following the BREEAM Fit Out assessment scheme.

For further details of the scope of Parts 1 to 4, see Scope of BREEAM Refurbishment.

Selecting the appropriate scheme

The appropriate scheme should be selected based on the extent of the works and the elements being modified or installed.

- Where works are limited to interior finishes and layout, BREEAM Fit Out Level 1 is appropriate.
- Where works include installation or modification of local building services within the tenant area, BREEAM Fit Out Level 2 may be appropriate.
- Where works extend beyond tenant-controlled areas or involve modifications to central building services or structure, BREEAM Refurbishment is the appropriate scheme.

Integration across the building lifecycle

The four schemes form a continuous framework:

- **New Construction** establishes the performance of the base building.
- **Refurbishment** addresses upgrades and major interventions.
- **Fit Out** ensures that tenant-led works maintain and enhance sustainability performance within the occupied space.
- **In-Use** assesses the operational performance of buildings during the occupation phase to ensure ongoing management, monitoring and improvement of sustainability performance.

Together, they enable a building to be assessed consistently across its lifecycle while reflecting the changing scope of works and responsibilities.

Checklists

Checklist A6

Checklist A6

See Wst 02 Recycled aggregates on page 370.

To demonstrate that the local best practice guidance for defining "granular fill and capping as a high grade use" is appropriate, the local guidance or standard must cover the requirements set out in Table 111 below and Table 112 below. Note: The extent and scope of this local guidance or standards will be checked by BRE waste experts to ensure that the overall effect is equivalent to the BREEAM requirements.

Table 111: Sampling and testing of processed or recovered product

Property description	Basic principle
General description	-
Aggregate composition (including organics)	Visual sorting of the plus 8mm fraction.
Particle size and grading	Size distribution of particles in an aggregate sample determined using test sieves (sieves meeting a national or equivalent standard for test sieves).
Fines content	Percentage of aggregate by mass passing a 0.063mm sieve.
Particle shape	Determination of the proportion (by mass) of flat or elongated particles.

Table 112: Requirement for additional testing of processed or recovered aggregate products by end use (note that tests and properties given in brackets are only required where the test is relevant to the end application or the local climate or is considered otherwise essential)

Test or property	Basic principle
(Surface abrasion resistance)	Determination through testing of the ability of aggregate particles to retain their shape characteristics under construction conditions and traffic (when relevant to the end use).
(Alkali silica reaction)	Aggregate reactivity in concrete (RILEM AAR3 or equivalent method) where there is concern about the possibility that the aggregate is alkali reactive.
(Resistance to freezing and thawing)	Resistance to fragmentation due to freezing and thawing action. Accelerated freeze-thaw test, magnesium sulfate soundness value or equivalent method.
(Polishing resistance)	Susceptibility of an aggregate to polishing (resistance to smoothing or loss of surface friction) when relevant to end use.
Bulk density	Determination of the loosely compacted bulk density of oven dry aggregate.
(Bearing capacity)	Determination of strength or bearing capacity of compacted aggregate or soil. Relevant to use of unbound aggregates in building or road foundations.
(Chlorides)	Determination of water soluble chloride content (relevant to use in concrete or mortar).
Evidence that there is no release of dangerous substances	In particular emission of radioactivity, release of heavy metals, release of polyaromatic hydrocarbons. Evidence to be provided when required and in case of doubt.
Water solubility	Water solubility of aggregate (percentage by mass).
(Organic contamination)	Relevant to use in mortar or concrete. Determination of constituents affecting the setting and hardening of concrete; presence of lightweight organic contaminators.
Particle density	Specific gravity or relative density of aggregate.
(Plasticity of fines)	A high proportion of plastic fines may be detrimental in asphalt or road construction. Testing may not be necessary where the total fines content of the aggregate does not exceed an agreed value which has been determined from local satisfactory use. Where the amount of fines may be considered plastic or harmful, apply one of the following or other equivalent method: (a) sand equivalent value; (b) plasticity index; or (c) methylene blue value.
(Resistance to fragmentation or impact)	Test to assess resistance of aggregate particles to degradation under impact.

Test or property	Basic principle
(Resistance to heat or thermal shock)	Relevant to application of aggregate in asphalt or bitumen. Change in physical properties of aggregates subjected to 700°C environment.
Sulfates and sulphides	When required, determination of acid soluble sulfate or total sulfur.
Water absorption	Increase in mass of a sample of oven dried aggregate due to the penetration of water into the water accessible voids.

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