PLEASE READ: BREEAM UK New Construction 2018 consultation

After 12 months of industry consultation and technical development, BRE has published the DRAFT 2018 version of the BREEAM UK New Construction scheme.

Feedback received so far has been collated to inform the development of BREEAM UK New Construction 2018 version. Our aim with the update continue to be to provide a robust and evidenced-based evaluation of performance of new building projects. We welcome feedback on all issues contained within this DRAFT manual.

Please note, as this is a DRAFT document, we are aware there are a few typos and formatting issues, all of which will be rectified for the FINAL manual. Please focus your comments on the technical proposals. We are considering a re-structure to the transport-related issues in the manual. This has not yet been incorporated in the DRAFT manual to enable consultation. We felt it important to consult on the concept prior to making the amendments to the individual issues. Below outlines our proposed re-structure of the transport section.

Transport proposal

The aim of the transport-related issues in BREEAM is to encourage access to sustainable means of transport for building users. These support reductions in transport-related energy use, pollution and congestion over the life of the building. Historically the BREEAM transport category has favoured site locations in urban or metropolitan areas. These areas are invariably well served by public transport networks, in close proximity to a wide range of local amenities and services, and have restrictions on land available for car parking. In such cases, projects typically achieve a significant number of credits for the transport category by default. Conversely, projects in rural areas typically struggle to achieve credits due to the site’s location, regardless of efforts made to implement sustainable transport initiatives.

Given the above, we are proposing to re-structure the criteria. This will reward projects that maximise opportunities to deliver the outcomes that BREEAM is seeking to promote. The proposal attempts to refocus and adapt the current requirements, rather than introduce a radically different approach.

The starting point will be an initial transport assessment in order to determine the ‘baseline’ for the assessment. This can form the basis for developing a travel plan or strategy. Projects would be rewarded for the measures implemented to improve upon the identified baseline.

The following provides an overview of the proposed structure and associated content for the updated transport category.

- Tra 01 transport assessment and travel plan Understanding the baseline - essentially the current Tra 05 requirements with some minor amendments to the text. The criteria would include reporting on the number and type of amenities within 500m of the site (based on current Tra 02 criteria), and reporting on the public transport accessibility (i.e. Tra 01 - proximity to train, bus etc. stops and frequency of services), which could include calculation of the Accessibility Index for the site.
- Tra 02 Sustainable transport measures Implementing sustainable transport measures - would reward projects implementing sustainable transport measures recommended in the travel plan, with credits dependent upon how many measures are implemented. A possible list of options could include:
  - Improvements to local cycling or footpath network
  - Provision of signposting to public transport, local amenities or both
  - Negotiation with local bus, train or tram companies to increase service provision
  - Provision of electric recharging stations
  - Car sharing facilities or car pool
  - Compliant cycle storage spaces and facilities
  - Car parking provision exceeds the local authority’s maximum car parking standard relevant to the project (i.e. provides less car parking than the prescribed maximum)
  - Provision of amenities and services on site where these are not available locally (i.e. within ~ 500m from the site)

To achieve any Tra 02 credits, it would be a prerequisite to achieve the Tra 01 credits for undertaking the site-specific transport assessment and travel plan. We would appreciate feedback on the proposed re-structure via the
online survey which can be found here. In addition to the transport category, another change is proposed for BREEAM UK New Construction 2018 manual. This is not currently included in this DRAFT, will be in the Land-use and Ecology section.


The proposed Ecology section for this scheme is subject to separate consultation and has not been included in this manual.

The BREEAM UK Strategic Ecology Framework (SEF) is currently being implemented across the BREEAM family of schemes as these are updated. This process involves development of the assessment issues, alignment, synergy and consistency where relevant across BREEAM schemes and built environment lifecycle stages. In support of this the proposed ecology assessment issues for this scheme are available for review in a separate consultation document.

The Assessment issues are available here: [www.breeam.com/strategic-ecology-framework](http://www.breeam.com/strategic-ecology-framework)

This contains the proposed content of the revised Ecology Assessment issues in this category. It outlines the proposed Assessment Issues and contains the detailed criteria for review and comment.

We are seeking input from a wide range of stakeholders who are involved in planning, delivering or maintaining BREEAM Ecology related aspects of development and assets. We very much welcome your input into this process.

Further information about the SEF and the consultation process is also available on the website.
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# Table of contents

PLEASE READ: BREEAM UK New Construction 2018 consultation .................................. i
What the new icons mean ........................................................................................................... xii
About BRE Global Limited ........................................................................................................ xv
About this Scheme Document .................................................................................................. xvi
Introduction to BREEAM ........................................................................................................... 17
BREEAM UK New Construction ............................................................................................... 20
Scope of the BREEAM UK New Construction 2018 scheme version .................................. 25
  Building life cycle stages covered by the BREEAM UK New Construction 2018 scheme version ................................................. 28
  Buildings types not covered under the BREEAM UK New Construction 2018 scheme version ................................................. 29
  Building life cycle stages not covered by the BREEAM UK New Construction 2018 scheme version ................................................. 30
Scoring and rating BREEAM-assessed buildings ........................................................................ 32
  BREEAM rating benchmarks ................................................................................................. 33
  Minimum standards ................................................................................................................ 35
  BREEAM assessment issues and credits ............................................................................... 36
  Calculating a building’s BREEAM rating ............................................................................. 37
The BREEAM evidential requirements ......................................................................................... 38
Management .............................................................................................................................. xlviv
  Man 01 Project brief and design ............................................................................................. xlv
  Man 01 Project brief and design ............................................................................................. xlvii
  Man 02 Life cycle cost and service life planning .................................................................. lvi
  Man 02 Life cycle cost and service life planning .................................................................. lx
  Man 03 Responsible construction practices ........................................................................ li
  Man 03 Responsible construction practices ........................................................................ lii
  Man 04 Commissioning and handover ............................................................................... lixiv
  Man 04 Commissioning and handover ............................................................................... lixx
  Man 05 Aftercare .................................................................................................................... lixxi
  Man 05 Aftercare .................................................................................................................... lixxii
Health and Wellbeing ............................................................................................................... lxxxvii
  Hea 01 Visual comfort ........................................................................................................... lxxxix
  Hea 01 Visual comfort ........................................................................................................... xc
  Hea 02 Indoor air quality ......................................................................................................... cvi
  Hea 02 Indoor air quality ......................................................................................................... cvii
  Hea 03 Safe containment in laboratories ............................................................................ cxx
  Hea 03 Safe containment in laboratories ............................................................................ cxxi
  Hea 04 Thermal comfort ........................................................................................................ cxxvi
Hea 04 Thermal comfort ........................................................................... cxxviii
Hea 05 Acoustic performance ................................................................... cxxiv
Hea 05 Acoustic performance ................................................................... cxxvi
Hea 06 Security ....................................................................................... cxdv
Hea 06 Security ....................................................................................... cxdvi
Hea 07 Safe and healthy surroundings ..................................................... cli
Hea 07 Safe and healthy surroundings ..................................................... cliv

Energy ........................................................................................................ rivii
Ene 01 Reduction of energy use and carbon emissions .................................... cli
Ene 01 Reduction of energy use and carbon emissions .................................... clxi
Ene 02 Energy monitoring .......................................................................... clxivii
Ene 02 Energy monitoring .......................................................................... clxvii
Ene 03 External lighting ........................................................................... clxxiii
Ene 03 External lighting ........................................................................... clxxiv
Ene 04 Low carbon design ....................................................................... clxxvii
Ene 04 Low carbon design ....................................................................... clxxviii
Ene 05 Energy efficient cold storage .......................................................... cxcvii
Ene 05 Energy efficient cold storage .......................................................... cxcix
Ene 06 Energy efficient transport systems .................................................. ccixi
Ene 06 Energy efficient transport systems .................................................. ccxiv
Ene 07 Energy efficient laboratory systems ............................................... ccviii
Ene 07 Energy efficient laboratory systems ............................................... ccx
Ene 08 Energy efficient equipment ............................................................ ccxv
Ene 08 Energy efficient equipment ............................................................ ccxvii

Transport ................................................................................................... ccxvi
Tra 01 Public transport accessibility ......................................................... ccxxiii
Tra 01 Public transport accessibility ......................................................... ccxxv
Tra 02 Proximity to amenities .................................................................. ccxxvi
Tra 02 Proximity to amenities .................................................................. ccxxvii
Tra 03 Alternative modes of transport ..................................................... ccxxvi
Tra 03 Alternative modes of transport ..................................................... ccxxviii
Tra 04 Maximum car parking capacity ..................................................... ccxlviii
Tra 04 Maximum car parking capacity ..................................................... ccxlv
Tra 05 Travel plan .................................................................................... ccxliv
Tra 05 Travel plan .................................................................................... ccxlvi

Water .......................................................................................................... ccdlx
<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wat 01 Water consumption</td>
<td>ccclx</td>
</tr>
<tr>
<td>Wat 01 Water consumption</td>
<td>ccclxii</td>
</tr>
<tr>
<td>Wat 02 Water monitoring</td>
<td>ccclxxii</td>
</tr>
<tr>
<td>Wat 02 Water monitoring</td>
<td>ccclxxiv</td>
</tr>
<tr>
<td>Wat 03 Water leak detection</td>
<td>ccclxxvii</td>
</tr>
<tr>
<td>Wat 03 Water leak detection</td>
<td>ccclxxix</td>
</tr>
<tr>
<td>Wat 04 Water efficient equipment</td>
<td>ccclxxxii</td>
</tr>
<tr>
<td>Wat 04 Water efficient equipment</td>
<td>ccclxxxiv</td>
</tr>
<tr>
<td>Materials</td>
<td>ccclxxxvi</td>
</tr>
<tr>
<td>Mat 01 Environmental impacts from construction products - Building life cycle assessment</td>
<td>287</td>
</tr>
<tr>
<td>Mat 01 Environmental impacts from construction products - Building life cycle assessment</td>
<td>289</td>
</tr>
<tr>
<td>Mat 02 Environmental impacts from construction products</td>
<td>302</td>
</tr>
<tr>
<td>Mat 02 Environmental impacts from construction products</td>
<td>304</td>
</tr>
<tr>
<td>Mat 03 Responsible sourcing of materials</td>
<td>307</td>
</tr>
<tr>
<td>Mat 04 Insulation</td>
<td>318</td>
</tr>
<tr>
<td>Mat 05 Designing for durability and resilience</td>
<td>319</td>
</tr>
<tr>
<td>Mat 05 Designing for durability and resilience</td>
<td>321</td>
</tr>
<tr>
<td>Mat 06 Material efficiency</td>
<td>325</td>
</tr>
<tr>
<td>Mat 06 Material efficiency</td>
<td>327</td>
</tr>
<tr>
<td>Waste</td>
<td>331</td>
</tr>
<tr>
<td>Wst 01 Construction waste management</td>
<td>332</td>
</tr>
<tr>
<td>Wst 01 Construction waste management</td>
<td>334</td>
</tr>
<tr>
<td>Wst 02 Use of recycled and sustainably sourced aggregates</td>
<td>342</td>
</tr>
<tr>
<td>Wst 02 Use of recycled and sustainably sourced aggregates</td>
<td>344</td>
</tr>
<tr>
<td>Wst 03 Operational waste</td>
<td>352</td>
</tr>
<tr>
<td>Wst 03 Operational waste</td>
<td>354</td>
</tr>
<tr>
<td>Wst 04 Speculative floor and ceiling finishes</td>
<td>357</td>
</tr>
<tr>
<td>Wst 04 Speculative floor and ceiling finishes</td>
<td>359</td>
</tr>
<tr>
<td>Wst 05 Adaptation to climate change</td>
<td>361</td>
</tr>
<tr>
<td>Wst 05 Adaptation to climate change</td>
<td>363</td>
</tr>
<tr>
<td>Wst 06 Design for disassembly and adaptability</td>
<td>368</td>
</tr>
<tr>
<td>Wst 06 Design for disassembly and adaptability</td>
<td>370</td>
</tr>
<tr>
<td>Land Use and Ecology</td>
<td>375</td>
</tr>
<tr>
<td>LE 01 Site selection</td>
<td>376</td>
</tr>
<tr>
<td>LE 01 Site selection</td>
<td>378</td>
</tr>
<tr>
<td>Pollution</td>
<td>381</td>
</tr>
<tr>
<td>Code</td>
<td>Title</td>
</tr>
<tr>
<td>-------</td>
<td>----------------------------------------------------------------------</td>
</tr>
<tr>
<td>Pol01</td>
<td>Impact of refrigerants</td>
</tr>
<tr>
<td>Pol01</td>
<td>Impact of refrigerants</td>
</tr>
<tr>
<td>Pol02</td>
<td>Local air quality</td>
</tr>
<tr>
<td>Pol02</td>
<td>Local air quality</td>
</tr>
<tr>
<td>Pol03</td>
<td>Flood and surface water management</td>
</tr>
<tr>
<td>Pol03</td>
<td>Flood and surface water management</td>
</tr>
<tr>
<td>Pol04</td>
<td>Reduction of night time light pollution</td>
</tr>
<tr>
<td>Pol04</td>
<td>Reduction of night time light pollution</td>
</tr>
<tr>
<td>Pol05</td>
<td>Reduction of noise pollution</td>
</tr>
<tr>
<td>Pol05</td>
<td>Reduction of noise pollution</td>
</tr>
<tr>
<td>Inn01</td>
<td>Innovation</td>
</tr>
<tr>
<td>Inn01</td>
<td>Innovation</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Appendix A</td>
<td>Healthcare building types</td>
</tr>
<tr>
<td>Appendix B</td>
<td>Education building types</td>
</tr>
<tr>
<td>Appendix C</td>
<td>Multi-residential building types</td>
</tr>
<tr>
<td>Appendix D</td>
<td>Shell only and Shell and Core Project Assessments</td>
</tr>
<tr>
<td>Appendix E</td>
<td>Simple Building Assessments</td>
</tr>
<tr>
<td>Appendix F</td>
<td>Examples of BREEAM UK New Construction certificates</td>
</tr>
<tr>
<td>Appendix G</td>
<td>Notes for compliance</td>
</tr>
</tbody>
</table>

References: 25
List of tables

<table>
<thead>
<tr>
<th>Table</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>BREEAM UK New Construction 2018 environmental sections and assessment issues</td>
</tr>
<tr>
<td>2</td>
<td>Non-domestic building types covered under BREEAM UK New Construction 2018</td>
</tr>
<tr>
<td>3</td>
<td>BREEAM rating benchmarks</td>
</tr>
<tr>
<td>4</td>
<td>BREEAM Environmental section weightings</td>
</tr>
<tr>
<td>5</td>
<td>Minimum BREEAM standards by rating level</td>
</tr>
<tr>
<td>6</td>
<td>Example BREEAM score and rating calculation</td>
</tr>
<tr>
<td>7</td>
<td>Minimum standards for a BREEAM Very Good rating</td>
</tr>
<tr>
<td>8</td>
<td>BREEAM evidence principles</td>
</tr>
<tr>
<td>9</td>
<td>General evidence types</td>
</tr>
<tr>
<td>10</td>
<td>Minimum values of average daylight factor required</td>
</tr>
<tr>
<td>11</td>
<td>Daylighting uniformity criteria</td>
</tr>
<tr>
<td>12</td>
<td>Space type and illuminance requirements - both criteria (average illuminance and minimum point illuminance) should be met</td>
</tr>
<tr>
<td>13</td>
<td>Additional alternative route for healthcare building types only</td>
</tr>
<tr>
<td>14</td>
<td>View out building specific requirements</td>
</tr>
<tr>
<td>15</td>
<td>Internal and external lighting building specific requirements</td>
</tr>
<tr>
<td>16</td>
<td>Exemplary level values of average daylight factor required</td>
</tr>
<tr>
<td>17</td>
<td>Exemplary level illuminance value requirements. Both criteria (average illuminance and minimum point illuminance) should be met</td>
</tr>
<tr>
<td>18</td>
<td>Reflectance for maximum room depths and window head heights</td>
</tr>
<tr>
<td>19</td>
<td>Recommended number of grid points</td>
</tr>
<tr>
<td>20</td>
<td>Exemplary level emission criteria by product type</td>
</tr>
<tr>
<td>21</td>
<td>Emission criteria by product type</td>
</tr>
<tr>
<td>22</td>
<td>Maximum TVOC content for paints and coatings</td>
</tr>
<tr>
<td>23</td>
<td>BREEAM acoustic criteria for education buildings</td>
</tr>
<tr>
<td>24</td>
<td>BREEAM acoustic criteria for healthcare buildings</td>
</tr>
<tr>
<td>25</td>
<td>BREEAM acoustic criteria for Office buildings</td>
</tr>
<tr>
<td>26</td>
<td>BREEAM acoustic criteria for law court buildings</td>
</tr>
<tr>
<td>27</td>
<td>BREEAM acoustic criteria for Industrial, Retail, Prisons and Other building types</td>
</tr>
<tr>
<td>28</td>
<td>BREEAM acoustic criteria for Multi-residential buildings</td>
</tr>
<tr>
<td>29</td>
<td>Ene 01 EPR NC benchmark scale</td>
</tr>
<tr>
<td>30</td>
<td>Exemplary performance credits</td>
</tr>
<tr>
<td>31</td>
<td>Best practice energy efficient measures in laboratories</td>
</tr>
<tr>
<td>32</td>
<td>Examples of significant contributors to unregulated energy consumption, for a number of different building types or functions, and the solutions deemed to comply</td>
</tr>
<tr>
<td>Table</td>
<td>Description</td>
</tr>
<tr>
<td>-------</td>
<td>-------------</td>
</tr>
<tr>
<td>33</td>
<td>Credits available for each building type relating to the public transport AI score.</td>
</tr>
<tr>
<td>34</td>
<td>Default hours of operation by building type for a typical day.</td>
</tr>
<tr>
<td>35</td>
<td>Criteria and credits for different building groups.</td>
</tr>
<tr>
<td>36</td>
<td>Criteria and credits for alternative modes of transport.</td>
</tr>
<tr>
<td>37</td>
<td>Cycle storage criteria for each building type.</td>
</tr>
<tr>
<td>38</td>
<td>Credits available in Tra04. Maximum car parking capacity for different building types.</td>
</tr>
<tr>
<td>39</td>
<td>Default occupancy rates by building type.</td>
</tr>
<tr>
<td>40</td>
<td>BREEAM credits available for percentage improvement over baseline building water consumption.</td>
</tr>
<tr>
<td>41</td>
<td>BREEAM credits based on overall performance level.</td>
</tr>
<tr>
<td>42</td>
<td>Water efficient consumption levels by component type.</td>
</tr>
<tr>
<td>43</td>
<td>Data requirements for each domestic component type.</td>
</tr>
<tr>
<td>44</td>
<td>Credit summary table.</td>
</tr>
<tr>
<td>45</td>
<td>Superstructure – In scope (criteria 1 to 5).</td>
</tr>
<tr>
<td>46</td>
<td>Substructure and hard landscaping – In scope (applicable to criteria 6 and 7).</td>
</tr>
<tr>
<td>47</td>
<td>Core building Services – In scope (applicable to criteria 8 and 9).</td>
</tr>
<tr>
<td>48</td>
<td>LCA Quality requirements.</td>
</tr>
<tr>
<td>49</td>
<td>Superstructure – Out of scope.</td>
</tr>
<tr>
<td>50</td>
<td>Substructure and hard landscaping – Out of scope.</td>
</tr>
<tr>
<td>51</td>
<td>Core building Services – Out of scope.</td>
</tr>
<tr>
<td>52</td>
<td>EPD points for different types of EPD.</td>
</tr>
<tr>
<td>53</td>
<td>Material classification.</td>
</tr>
<tr>
<td>54</td>
<td>BREEAM credits available for percentage of RSM points achieved.</td>
</tr>
<tr>
<td>55</td>
<td>Scope assessment, common building element designation and location and use categories.</td>
</tr>
<tr>
<td>56</td>
<td>Material categories.</td>
</tr>
<tr>
<td>57</td>
<td>Examples of relevant industry durability or quality standards and design guides.</td>
</tr>
<tr>
<td>58</td>
<td>Examples of material efficiencies at each work stage.</td>
</tr>
<tr>
<td>59</td>
<td>Construction waste resource efficiency benchmarks.</td>
</tr>
<tr>
<td>60</td>
<td>Diversion from landfill benchmarks.</td>
</tr>
<tr>
<td>61</td>
<td>Construction waste groups.</td>
</tr>
<tr>
<td>62</td>
<td>Credits available relating to the Project Sustainable Aggregate points.</td>
</tr>
<tr>
<td>63</td>
<td>Aggregate uses.</td>
</tr>
<tr>
<td>64</td>
<td>Aggregate types.</td>
</tr>
<tr>
<td>65</td>
<td>Region of source (quarry or marine dredge site).</td>
</tr>
<tr>
<td>66</td>
<td>Aggregate regional abiotic depletion potential.</td>
</tr>
</tbody>
</table>
List of tables

Table 67 Social cost of transport .......................................................... 350
Table 68 Carbon footprint ................................................................. 350
Table 69 Criterion 5 on page 1 requirements ...................................... 363
Table 70 Climate change adaptation strategy appraisal examples .......... 366
Table 71 Design measures allowing future adaptation ....................... 373
Table 72 Examples of design measures and aspects to consider regarding future disassembly ......................................................... 374
Table 73 Default system operational design life values ....................... 386
Table 74 Default values for DELC calculation when manufacturer’s figures are not available .......................................................... 386
Table 75 List of some common refrigerant types with low GWP .......... 389
Table 76 Maximum NOx emission levels by appliance type, fuel and AQMA ............................................................. 393
Table 77 Maximum particulate matter and volatile organic compound emissions for appliances using biomass, solid fuel and wood pellets ....................................................... 393
Table 78 Definition of flood zones by country ................................... 410
Table 79 BREEAM UK New Construction 2018 issue applicability for Simple building assessments ......................................................... J
List of figures

<b>Figure 1</b> The BREEAM Certification mark ................................................................. 19

<b>Figure 2</b> BREEAM assessment and certification stages and the Royal Institute of British Architects (RIBA) Outline Plan of Work 2013 ................................................................. 21
What the new icons mean

Icons have been designed to visually represent some of the information in the manual to assist your understanding. These are colour coded to align with the BREEAM category colours.

<table>
<thead>
<tr>
<th>BREEAM assessment types</th>
<th>Category weightings</th>
<th>Assessment issue credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fully-fitted</td>
<td>![Bag Icon]</td>
<td>![Door Icon]</td>
</tr>
<tr>
<td>Simple building</td>
<td>![Bag Icon]</td>
<td>![Door Icon]</td>
</tr>
<tr>
<td>Shell and core</td>
<td>![Bag Icon]</td>
<td>![Door Icon]</td>
</tr>
<tr>
<td>Shell only</td>
<td>![Bag Icon]</td>
<td>![Door Icon]</td>
</tr>
</tbody>
</table>

**Category weightings**

Four icons showing the weighting for each assessment type within the category. For example, if the weighting for fully fitted assessment is 15% then the icon will contain the figure **15%**.

**Assessment issue credits**

Four icons representing the four assessment types and the number of credits available for that assessment issue. For example, if two credits are available for a Simple building (SB) assessment, the SB icon will contain the number **2**.

Where exemplary credits are available for an assessment issue, these are shown as a star in the top right hand corner of the assessment issue icons. The number of exemplary credits is shown within the star.

- ![Star Icon] Where there are exemplary credits available
- ![Star Icon 2] Two exemplary credits are available

The combined icon would look like this
**Minimum standard**

One of six minimum standard icons is shown along with the assessment issue credit icon. The minimum standard star cluster indicates which BREEAM rating the assessment issue minimum standard applies to.

<table>
<thead>
<tr>
<th>Ratings with a minimum standard</th>
<th>Icon</th>
</tr>
</thead>
</table>
| No Minimum standard           | ★★★★★
|                               | ★★★★
|                               | ★★★
|                               | ★★
|                              | ★ |
| Outstanding                   | ★★★★★
|                               | ★★★★
|                               | ★★★
|                               | ★★
|                               | ★ |
| Excellent and Outstanding     | ★★★★★
|                               | ★★★★
|                               | ★★★
|                               | ★★
|                               | ★ |
| Very good, Excellent and Outstanding | ★★★★★
|                               | ★★★★
|                               | ★★★
|                               | ★★
|                               | ★ |
| Good, Very good, Excellent and Outstanding | ★★★★★
|                               | ★★★★
|                               | ★★★
|                               | ★★
|                               | ★ |
| Pass, Good, Very good, Excellent and Outstanding | ★★★★★
|                               | ★★★★
|                               | ★★★
|                               | ★★
|                               | ★ |
About BRE Global Limited

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

BRE Global Limited's mission is to 'Protect People, Property and the Planet'.

We aim to achieve this by:

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

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

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

1. Building Research Establishment’s Environmental Assessment Method (BREEAM) - the world’s leading environmental assessment method for buildings
2. Loss Prevention Certification Board (LPCB) for approval of fire and security products and services.

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

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www.breglobal.com www.greenbooklive.com
About this Scheme Document

This document is the technical manual for the BREEAM UK New Construction 2018 Scheme. It describes an environmental performance standard against which new, non-domestic buildings in the UK can be assessed and achieve a BREEAM New Construction rating.

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

Application of the BREEAM UK New Construction 2018 scheme in Wales, Scotland, England and Northern Ireland

Standalone versions of the technical manual of the BREEAM UK New Construction 2018 scheme are available for the assessment of buildings in Scotland, Northern Ireland, England and Wales. These technical manuals detail the country-specific criteria and benchmarks applicable to BREEAM assessments of new buildings in their respective territory.

The online version of the BREEAM UK New Construction 2018 technical manual contains all applicable criteria and benchmarks for all countries of the UK. Both the UK online and downloadable country-specific manuals for Scotland, Wales, Northern Ireland and England are available from www.breeam.com.

This document is the Scotland Wales Northern Ireland England UK technical manual for the BREEAM UK New Construction 2018 Scheme. It describes an environmental performance standard against which new, non-domestic buildings in this territory can be assessed and achieve a BREEAM New Construction rating.

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

The full online version of the BREEAM UK New Construction 2018 technical manual contains the criteria and benchmarks for all territories of the UK. Both the UK online and downloadable country-specific manuals for Scotland, Wales, Northern Ireland and England are available from www.breeam.com.

Changes to this BREEAM Scheme Document

This Scheme Document is subject to revision and can be re-issued from time-to-time by BRE Global Limited. A schedule of the publication date for each issue of this document is provided below.

Any additions to this document that necessitates its re-issue will be highlighted throughout the text (note: deletions are not identified in the updated issue). A detailed list of all additions and deletions made to each issue is available separately. BREEAM Assessors can download this list of changes from the BREEAM Assessor’s Extranet. The list of changes is also available to other parties on request; please email breeam@bre.co.uk.
Introduction to BREEAM

BREEAM is the world’s first and leading sustainability assessment and certification scheme for the built environment. It is an international standard that is locally adapted, operated and applied through a network of scheme operators, assessors and industry professionals.

Through its application, BREEAM recognises and reflects the value in higher performing assets and aims to inspire and empower change by rewarding and motivating sustainability across the life cycle of master-planning projects, infrastructure and buildings.

Launched in 1990, to date, BREEAM has been used to certify over 590,000 assessments of buildings across the building life cycle and is being applied in over 78 countries.

BREEAM aim and objectives

BREEAM assesses, encourages and rewards environmental, social and economic sustainability throughout the built environment. The BREEAM schemes:

- encourage continuous performance improvement and innovation by setting and assessing against a broad range of scientifically rigorous requirements that go beyond current regulations and practice,
- empower those who own, commission, deliver, manage or use buildings, infrastructure or communities to achieve their sustainability aspirations,
- build confidence and value by providing independent certification that demonstrates the wider benefits to individuals, business, society and the environment.

Objectives of BREEAM UK New Construction

- To provide market recognition of buildings with a low environmental impact
- To ensure best environmental practice is incorporated in the planning, design, construction and operation of buildings and the wider built environment.
- To challenge the market to provide innovative, cost effective solutions that minimise the environmental impact of buildings.
- To allow organisations to demonstrate progress towards corporate environmental objectives.

BREEAM is developed and operated to meet the following underlying principles:

- Ensure environmental quality through an accessible, holistic and balanced measure of environmental impacts.
- Use quantified measures for determining environmental quality.
- Adopt a flexible approach that encourages and rewards positive outcomes, avoiding prescribed solutions.
- Use robust science and best practice as the basis for quantifying and calibrating a cost effective and rigorous performance standard for defining environmental quality.
- Integrate building professionals in the development and operational processes to ensure wide understanding and accessibility.
- Adopt third party certification to ensure independence, credibility and consistency of the label.
- Adopt existing industry tools, practices and other standards wherever possible to support developments in policy and technology, build on existing skills and understanding and minimise costs.
- Align technically and operationally with relevant international standards, including the suite of standards on the ‘Sustainability of Construction Works’ prepared by the European Committee for Standardisation Technical Committee CEN/TC 350.
- Engage with a representative range of stakeholders to inform ongoing development in accordance with the underlying principles and the pace of change in performance standards (accounting for policy, regulation and market capability).

The aims, objectives and principles of BREEAM are embodied within a Core Standard (Process, Science and Technical) owned and managed by BRE Global Limited. This Core Standard is applied to cover aspects of the built environment life through a suite of BREEAM Schemes. Locally developed and operated versions of the schemes are used in other countries by organisations known as National Scheme Operators (NSOs).

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

For a full list of BREEAM National Scheme Operators and Schemes visit www.breeam.com.
The UK BREEAM Schemes

BRE Global Limited is the scheme operator of BREEAM in the UK. We develop and operate a number of BREEAM versions, each designed to assess the sustainability performance of buildings, projects or assets at various stages in the life cycle, and these include:

- BREEAM Communities for the master-planning of a larger community of buildings
- BREEAM New Construction: Buildings for new build, domestic and non-domestic buildings
- BREEAM New Construction: Infrastructure for new build infrastructure projects
- BREEAM In-Use for existing non-domestic buildings in-use
- BREEAM Refurbishment and Fit Out for domestic and non-domestic building fit-outs and refurbishments

Trust in the Mark

It is important that developers and their customers can have trust in the integrity and rigour of BREEAM. As a formal third party certification scheme, robustness and fairness are key aspects that underpin the method. BREEAM provides confidence in two ways:

1. Creation and operation of the Mark

The credibility and consistency of the BREEAM assessment and rating is a fundamental part of the scheme. As the UK’s leading building science centre, BRE is owned by the BRE Trust, a registered charity that works to improve the quality and sustainability of our buildings and built environment for the wider public benefit. BRE promotes best practice and develops knowledge and understanding throughout the sector and is independent from those interest groups involved in the design and construction of new buildings.

BRE is highly respected as a world leading authority in building performance research, testing, evaluation, standard setting and certification with over 90 years of experience operating both within the UK and internationally. The science-based content and independent application in accordance with recognised International Standards(4) underpin both the creation and operation of BREEAM. BRE Global, the BRE’s certification body and operators of BREEAM, is accredited by the United Kingdom Accreditation Service (UKAS) against these standards to ensure independence, competence and impartiality.

A key aspect of this impartiality is the open and accountable governance structure. The operation of BREEAM (as with all our assurance activities) is overseen by an independent Governing Body and a broad cross-industry Standing Panel who provide peer and market review as well as technical and operational oversight of our activities. The Governing Body represents a breadth of stakeholder interests to ensure, among other things, that BRE Global acts in a manner that is beyond reproach, operates our processes correctly, treats our customers fairly and is always acting for the public good.

2. Process of certification

Independence is a key feature of BREEAM as it provides confidence to the consumer. Assessors are trained and licensed by BRE to undertake the BREEAM assessment and determine a rating. To view a current list of BREEAM Assessors visit www.greenbooklive.com

The BREEAM Assessor will evaluate the design, specification and construction of a new development using the criteria and methodologies defined in this technical manual and it’s supporting assessment tools.

Once an assessment is complete and has achieved a positive outcome in the BRE Global quality assurance procedure, a certificate will be issued. The certificate provides formal verification that the BREEAM Assessor has completed their assessment in accordance with the requirements of the scheme and its quality standards. In turn providing confidence to any interested party or stakeholder in the BREEAM rating and performance of the new development.

Anyone wishing to verify a certified assessment and rating of a new development against BREEAM can do so by either checking its BREEAM certificate, see examples in Appendix F: Examples of BREEAM UK New Construction certificates on page M, which will contain the scheme’s certification mark (see Figure 1 on the facing page), or by searching the project listings on Green Book Live www.greenbooklive.com.
Introduction to BREEAM

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

**Figure 1** The BREEAM Certification mark
BREEAM UK New Construction

The BREEAM UK New Construction scheme is a performance based assessment method and certification scheme for new buildings.

The primary aim of BREEAM UK New Construction is to mitigate the life cycle impacts of new buildings on the environment in a robust and cost effective manner. This is achieved through integration and use of the scheme by clients and their project teams at key stages in the design and construction process.

Clients can measure, evaluate and reflect the performance of their new building against best practice in an independent and robust manner.

Performance is quantified by individual measures and associated criteria stretching across a range of environmental issues and expressed as a single certified BREEAM rating, i.e. the label.

Table 1  BREEAM UK New Construction 2018 environmental sections and assessment issues

<table>
<thead>
<tr>
<th>Management</th>
<th>Health and wellbeing</th>
</tr>
</thead>
<tbody>
<tr>
<td>– Project brief and design</td>
<td>– Visual comfort</td>
</tr>
<tr>
<td>– Life cycle cost and service life planning</td>
<td>– Indoor air quality</td>
</tr>
<tr>
<td>– Responsible construction practices</td>
<td>– Safe containment in laboratories</td>
</tr>
<tr>
<td>– Commissioning and handover</td>
<td>– Thermal comfort</td>
</tr>
<tr>
<td>– Aftercare</td>
<td>– Acoustic performance</td>
</tr>
<tr>
<td></td>
<td>– Safety and security</td>
</tr>
<tr>
<td></td>
<td>– Safe and healthy surroundings</td>
</tr>
</tbody>
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<table>
<thead>
<tr>
<th>Energy</th>
<th>Transport – subject to consultation</th>
</tr>
</thead>
<tbody>
<tr>
<td>– Reduction of energy use and carbon emissions</td>
<td>– Public transport accessibility</td>
</tr>
<tr>
<td>– Energy monitoring</td>
<td>– Proximity to amenities</td>
</tr>
<tr>
<td>– External lighting</td>
<td>– Cyclist facilities</td>
</tr>
<tr>
<td>– Low carbon design</td>
<td>– Maximum car parking capacity</td>
</tr>
<tr>
<td>– Energy efficient cold storage</td>
<td>– Travel plan</td>
</tr>
<tr>
<td>– Energy efficient transport systems</td>
<td></td>
</tr>
<tr>
<td>– Energy efficient laboratory systems</td>
<td></td>
</tr>
<tr>
<td>– Energy efficient equipment</td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Water</th>
<th>Materials</th>
</tr>
</thead>
<tbody>
<tr>
<td>– Water consumption</td>
<td>– Building life cycle assessment</td>
</tr>
<tr>
<td>– Water monitoring</td>
<td>– Environmental Product Declarations</td>
</tr>
<tr>
<td>– Water leak detection</td>
<td>– Responsible sourcing of materials</td>
</tr>
<tr>
<td>– Water efficient equipment</td>
<td>– Designing for durability and resilience</td>
</tr>
<tr>
<td></td>
<td>– Material efficiency</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Waste</th>
<th>Land use and ecology - subject to consultation</th>
</tr>
</thead>
<tbody>
<tr>
<td>– Construction waste management</td>
<td>– Site selection</td>
</tr>
<tr>
<td>– Low impact aggregates in the construction process</td>
<td></td>
</tr>
<tr>
<td>– Operational waste</td>
<td></td>
</tr>
<tr>
<td>– Speculative floor and ceiling finishes</td>
<td></td>
</tr>
<tr>
<td>– Adaptation to climate change</td>
<td></td>
</tr>
<tr>
<td>– Design for disassembly and functional adaptability</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Pollution</th>
<th>Innovation</th>
</tr>
</thead>
<tbody>
<tr>
<td>– Impact of refrigerants</td>
<td>– Innovation</td>
</tr>
<tr>
<td>– Local air quality</td>
<td></td>
</tr>
<tr>
<td>– Surface water run-off</td>
<td></td>
</tr>
<tr>
<td>– Reduction of night time light pollution</td>
<td></td>
</tr>
<tr>
<td>– Reduction of noise pollution</td>
<td></td>
</tr>
</tbody>
</table>
When and how to engage with the BREEAM UK New Construction scheme

Early engagement with the BREEAM UK New Construction scheme and appointment of a licensed BREEAM Assessor is important to achieve optimal integration of the methodology into the new build procurement process. At this early stage, the performance of the building and the desired BREEAM rating can be achieved while there is greater flexibility and choice in design solutions and spending decisions.

Figure 2 below shows the link between the BREEAM UK New Construction assessment and certification stages and the RIBA Outline Plan of Work 2013.

Clients can use this to understand when they should ideally engage with BREEAM and appoint a BREEAM Advisory Professional and BREEAM Assessor.

Up to date listings of licensed BREEAM UK New Construction Assessors and BREEAM Advisory Professionals are available at Green Book Live www.greenbooklive.com.

BREEAM primarily reflects the overall performance of the building rather than just the opportunities or limitations placed on specific stakeholders involved in the process. In the case of new builds, this means that the client, design team, principal contractor and BREEAM Assessor, as well as other specialist disciplines, have an important role to play throughout the procurement process, if the desired performance level is to be achieved and reflected through the certified BREEAM rating.

Orientating the brief towards BREEAM needs to come first and foremost from the client. BRE recommends that clients and their project teams engage with a licensed BREEAM Assessor and BREEAM Advisory Professional no later than the Preparation and Brief stage (RIBA Stage 1 or equivalent) and ideally sooner. 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 to environmental impacts can be sought and applied wherever possible.

Figure 2 BREEAM assessment and certification stages and the Royal Institute of British Architects (RIBA) Outline Plan of Work 2013
Plan of Work for BREEAM

Work sponsored by the UK government to support the use of building information modelling (BIM) introduced an agreed pan-industry protocol, the Digital Plan of Work (DPoW). The DPoW is applicable to all construction disciplines: infrastructure, buildings etc., and is a framework that enables the deliverables required at each stage of a construction project, from developing the strategy through to managing the asset, to be defined. There is little difference between the DPoW and more familiar RIBA Plan of Works 2013 (RIBAPoW), and while rapid adoption of the DPoWs is occurring, particularly for projects that may not be architecture led, primary reference in the new version of the UK New Construction scheme continues to be the RIBAPoW.
How to use the BREEAM UK New Construction 2018

This technical document has been created to:

1. Enable licensed BREEAM Assessors to complete BREEAM assessments and determine a rating
2. Enable BRE Global Ltd to complete quality assurance evaluation of a BREEAM Assessor's assessment and make a certification decision.
3. Aid BREEAM Advisory Professionals (AP) to undertake project team facilitation, in 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.

The document has six parts:

1. Introduction to BREEAM on page 17
2. Scope of the BREEAM UK New Construction 2018 scheme version on page 25
3. Scoring and rating BREEAM-assessed buildings on page 32, including minimum standards
4. The BREEAM evidential requirements on page 38
5. BREEAM categories
6. Appendices on page cxviii (A – G).

The Scope section describes the types of buildings and stages of assessment that this version of the BREEAM UK New Construction scheme can be applied to. Appendices A to F provide additional scoping guidance for specific building and project types. The Scope section can be used by clients and BREEAM Assessors to check whether this is the correct BREEAM scheme to use for their 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 environmental section weightings. It also includes a description of the BREEAM assessment issues and ‘credits’, including ‘Innovation credits’, and how performance against these is calculated and expressed as a BREEAM rating.

The BREEAM evidential requirements section provides guidance to assessors and project teams on the various types and forms of evidence required by the BREEAM Assessor to demonstrate compliance with assessment criteria. This includes a description of why BREEAM requires an auditable trail of evidence, a table of general types of information produced during a building project, and therefore typically required and used as evidence of compliance, and guidance on the differing forms of evidence that can be used and at what stages of the assessment, such as letters of commitment.

The BREEAM categories section includes the assessment issues, categorised in 10 environmental sections. Each issue defines a level of performance (the assessment criteria) against which the assessed building demonstrates compliance (using appropriate project information, i.e. evidence) in order to achieve BREEAM credits.

The majority of BREEAM issues and credits are tradable so a client and their project team can pick and choose which ones to target to build their BREEAM score and achieve the desired rating. Several assessment issues have minimum standards, meaning that specific credits or criteria must be achieved for a particular BREEAM rating (BREEAM minimum standards are identified in the Scoring and rating BREEAM-assessed buildings section).

Each BREEAM issue is structured as follows:

1. Issue information: contains the assessment issue reference, title, number of credits available(1) and whether the issue forms part of the BREEAM minimum standards.
2. Aim: outlines the objective of the issue and the impact it measures or mitigates.
3. Value and context: outlines the key value of the issue and summarises beneficial outcomes resulting from compliance with the issue criteria
4. Assessment scope: indicates how to apply the issue for different types of assessment and project specific circumstances
5. Assessment criteria: identifies how many parts for the issue and the number of credits associated with those parts. States each of the requirements of the issue and in affect the means by which the issue aim is achieved and value is realised by the project, in complying. Where the building complies with all the relevant criteria, as determined by the licensed BREEAM Assessor, the requisite number of credits can be awarded. Some issues also have Exemplary Level Criteria with additional exemplary credits available where a building...
demonstrates that it meets this criteria (refer to Innovation on page 422 for more details). Up to a maximum of 10 Innovation credits are available.

6. **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.

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. The BREEAM evidence requirements section provides further guidance on evidential requirements.

8. **Definitions**: includes any definition of terms used in the assessment issue

9. **Checklists and tables**: contains any checklists and useful tables.

10. **Additional information**: contains any further information relevant to the application of the assessment criteria, or sources of additional information that may be of use in addressing the issue.

The **Appendices** provide supporting information relevant to either the scope of the BREEAM UK New Construction 2018 or its assessment criteria.
Scope of the BREEAM UK New Construction 2018 scheme version

The BREEAM UK New Construction 2018 scheme can be used to assess the environmental life cycle impacts of new non-domestic buildings at the design and construction stages. ‘New Construction’ is defined as development that results in a new standalone structure, or new extension to an existing structure, which will come into operation or use for the first time upon completion of the works.

This BREEAM UK New Construction 2018 scheme version is applicable to new non-domestic buildings in the United Kingdom only.

Type of buildings that can be assessed using the BREEAM UK New Construction 2018 scheme version

The non-domestic building types which can be assessed and rated using this scheme version are outlined in Table 2 below. Additional guidance for some of the building types listed is also provided in the appendices (refer to the footnotes).

Table 2 Non-domestic building types covered under BREEAM UK New Construction 2018

<table>
<thead>
<tr>
<th>Building type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Commercial</strong></td>
<td></td>
</tr>
</tbody>
</table>
| Office | – General office buildings  
– Offices with research and development areas (i.e. category 1 labs only) |
| Industrial | – Industrial unit – warehouse storage or distribution  
– Industrial unit – process, manufacturing or vehicle servicing |
| Retail | – Shop or shopping centre  
– Retail park or warehouse  
– ‘Over the counter’ service provider, e.g. financial, estate and employment agencies and betting offices  
– Showroom  
– Restaurant, café and drinking establishment  
– Hot food takeaway |
| **Public (non-housing)** | | |
| Education(2) | – Preschool  
– Schools and sixth form colleges  
– Further educational or vocational colleges  
– Higher education institutions |
| Healthcare(3) | – Teaching or specialist hospitals  
– General acute hospitals  
– Community and mental health hospitals  
– GP surgeries  
– Health centres and clinics |
| Prison(4) | – High security prison  
– Standard secured prison  
– Young offender institution and juvenile prisons  
– Local prison  
– Holding centre |
| Law Court | – Law courts  
– Crown and criminal courts  
– County courts  
– Magistrates’ courts  
– Civil justice centres  
– Family courts  
– Youth courts  
– Combined courts |
<table>
<thead>
<tr>
<th>Building type</th>
<th>Description</th>
</tr>
</thead>
</table>
| **Multi-residential accommodation or supported living facility**<sup>(5)</sup> | Residential institution (long term stay)  
- Residential care home  
- Sheltered accommodation  
- Residential college or school (halls of residence)  
- Local authority secure residential accommodation  
- Military barracks  
| **Other** | Residential institution (short term stay)  
- Hotel, hostel, boarding and guest house  
- Secure training centre  
- Residential training centre  
| | Non-residential institution  
- Art gallery, museum  
- Library  
- Day centre, hall, civic or community centre  
- Place of worship  
| | Assembly and leisure  
- Cinema  
- Theatre, music or concert hall  
- Exhibition or conference hall  
- Indoor or outdoor sports, fitness and recreation centre (with or without pool)  
| | Other  
- Transport hub (coach or bus station and above ground rail station)  
- Research and development (category 2 or 3 laboratories - non-higher education)  
- Crèche  
- Fire Stations  
- Visitor Centres  
| | 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 BREEAM Bespoke Process Guidance Note GN23.

**Mixed use developments and building types**

Developments with a number of separate buildings of differing functional types, or a single building with different functions, e.g. office and retail or retail and GP surgery, will require an assessment and therefore BREEAM rating and certificate for each individual building in the development or each functional use within a single building.

This is necessary as BREEAM defines criteria and benchmarks for some assessment issues according to building type, function and use. To maintain comparability and consistency of the assessment and BREEAM rating, a separate registration, assessment score and rating are therefore required for each building type function or use in the development.

Licensed Assessors will find further guidance on how to define mixed use developments for the purpose of an assessment in Guidance Note GN10 – Mixed use developments and similar buildings (or units).

**BREEAM UK New Construction 2018 assessment types**

A number of assessment types are defined and can be applied to assess and rate the performance of a new building. These are:

- Fully fitted (applicable to all buildings apart from those defined as a ‘simple’ building)
- Fully fitted – ‘simple’ building (see Appendix E – Simple Building Assessments on page I)
- Shell and Core (see Appendix D – Shell only and Shell and Core Project Assessments on page D)
- Shell only (see Appendix D – Shell only and Shell and Core Project Assessments on page D)
The assessment criteria for these options are identified in each assessment issue in this technical manual. The assessor in collaboration with the client and design team should determine which assessment type is relevant for their project and assess the criteria accordingly.

**Similar building types (or units) on the same site**

A number of separate but similar buildings, or individual units within a larger building development can be assessed and rated with one BREEAM assessment. Further guidance on applying BREEAM in this way can be found in Guidance Note GN10 – Mixed use developments and similar buildings (or units).

**Part new-build, part refurbishment projects**

For developments that are a mix of new-build and refurbishment of existing spaces the choice of scheme selection and application is determined according to the scope of the new build and refurbishment works.

For smaller projects, where the total development area is less than 1000m², a single BREEAM assessment can be undertaken to cover both the new-build and refurbished areas. The choice of BREEAM New Construction or BREEAM Refurbishment and Fit-out scheme should be based on whichever (new-build or refurbishment) constitutes the majority of the assessed floor area.

For larger projects a single New Construction assessment can be undertaken; however the refurbished areas have to comply with assessment criteria designed for new builds, which can be more challenging in some instances. If the development is predominantly a refurbishment with new-build extension then the BREEAM Refurbishment and Fit-out scheme may be the most appropriate, as it contains thresholds under which a single Refurbishment and Fit-out assessment can be completed.

Where none of the above options are deemed suitable for the project there are two further options:

**Option 1: Separate BREEAM New Construction and BREEAM Refurbishment and Fit-out assessments**

Under option 1, two separate BREEAM assessments would be conducted with a BREEAM New Construction assessment undertaken on the new extension and a BREEAM Refurbishment and Fit-out assessment undertaken on the existing building refurbishment or fit-out. Two separate certificates and ratings can be obtained to indicate the performance of both the new extension and existing building refurbishment or fit-out.

**Option 2: Bespoke BREEAM combined New Construction and Refurbishment and Fit-out assessment**

Under option 2, BRE Global will produce a Bespoke criteria appendix document which will determine, for specific BREEAM issues, which issues and assessment criteria are applicable to the part new build-part refurbishment project. It will refer to both the BREEAM UK Refurbishment and Fit Out manual and the BREEAM UK New Construction manuals. A bespoke Scoring and Reporting tool will also be produced for the project.

As part of the bespoke criteria development for issue Ene 01 we allow the new build to be assessed against the New Construction scheme and the refurbishment against the RFO scheme. The tool performs an area-weighted average score. It is also possible for the extension to be included under the RFO criteria where following CN6 ‘Extensions to existing buildings and new constructed thermal elements’. The tool also creates area-weighted construction resource benchmarks for the Resource efficiency credit in issue Wst 01 Construction waste management on page 332.

In determining the appropriate option for a part new build part-refurbishment project, the BREEAM Assessor should review the scope of the proposed works and consider in particular the scope of the refurbished elements. Considerations such as whether it is a major refurbishment, will there be a significant change of use and will the building’s thermal and structural elements remain unchanged? Using this information the assessor should advise the client on the most suitable BREEAM version or scheme for maximising the building’s environmental performance.
Building life cycle stages covered by the BREEAM UK New Construction 2018 scheme version

This BREEAM UK New Construction Scheme can be used to assess and rate the environmental impacts arising from a newly constructed building development (including external site areas), at the following life cycle stages:

1. New Build Design Stage (DS) (optional) - leading to an Interim BREEAM rating and certificate of assessment
2. New Build post-construction Stage (PCS) – leading to a Final BREEAM rating and certificate of assessment
3. New Build Verification Stage (optional) - leading to a certification relating to robust best practice, to meet design aspirations, in the following areas:
   a. post occupancy handover and commissioning processes
   b. performance monitoring
   c. actions undertaken post occupancy to understand and manage the actual performance of the building.

Design Stage

The DS assessment and interim BREEAM rating is optional and can be used to demonstrate the proposed new 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 new construction 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 (PCS)

The PCS assessment and BREEAM rating is a mandatory certification stage that can be used to demonstrate the final 'as-built' performance of the building at the new construction stage of the life cycle. A final PCS assessment is completed and certified after practical completion of the building works.

There are two approaches to assessment at the PCS:

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 the 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.

Verification Stage

The verification stage is an optional third stage of assessment under the UK New Construction scheme. This stage confirms the process of monitoring, reviewing and reporting on the performance of the building once occupied. It is carried out a minimum of 12 months after occupation and would normally be before a period of 2 years has lapsed from the date of 'full' occupation (defined as occupation of 70% of the occupiable space in the building).

This will focus on best practice project commissioning and handover and post occupation support and aims to help the Design Team, Facilities Manager and building owner understand the actual performance of the building and optimise this in line with design expectations. The assessment will review post occupancy monitoring processes and identify where there are deficiencies to rectify or opportunities to take. The verification stage is only applicable to fully fitted assessments, it is not available for shell only and shell and core assessments.

The verification stage will also entail a review of commitments made at the Post Construction stage within the UK New Construction scheme.
In order to complete the verification stage, various issues in the UK New Construction scheme need to be achieved at the post construction stage, as follows:

1. **Man 05 Aftercare on page lxx** (3 credits)
2. **Ene 01 Reduction of energy use and carbon emissions on page clx** (4 credits)
3. **Wat 01 Water consumption on page cclx** (up to 5 credits)

For these issues, evidence must be collated after the building has been handed over to demonstrate compliance at the verification stage. Evidence requirements are detailed in the individual assessment issues.

Additional credits are available within the UK New Construction scheme (Ene 01) where a contractual commitment is made to complete and achieve certification at the verification stage. The verification stage is only applicable to fully fitted assessments and is not available for Shell only and Shell and core assessments.

The verification stage can provide an interim step between the UK New Construction Post Construction assessment and assessment in occupation under **BREEAM In-Use**. It provides a more realistic view of building performance and occupation patterns than is possible at the new construction stage and so, helps to ensure that the building performs as expected.

A more specific consultation on the details of the Verification stage process will follow this DRAFT manual and can be found [here](#).
Buildings types not covered under the BREEAM UK New Construction 2018 scheme version

Building types not listed in Scope of the BREEAM UK New Construction 2018 scheme version #Table 2 on page 25 will fall into one of two categories, those where a current but separate BREEAM UK New Construction scheme technical manual exists and those which currently do not have an existing and current technical manual.

Other current BREEAM New Construction schemes

Data centres

A BREEAM UK New Construction scheme 2010 version and technical manual for Data Centres (SD5068) should be used for the assessment and certification of data centres in the UK.

Other building types not defined

If your building type is not defined in scope the of this manual, it can still be assessed using BREEAM UK New Construction scheme. Such building types are assessed using a bespoke set of UK New Construction assessment criteria. Licensed BREEAM Assessors and clients should refer to Guidance note GN23 for information on how to proceed.
Building life cycle stages not covered by the BREEAM UK New Construction 2018 scheme version

The BREEAM UK New Construction scheme is not designed to assess the environmental impacts of buildings at the following life cycle stages:

1. Existing building major and minor refurbishments and fit-outs (See scope of BREEAM UK Refurbishment and Fit-out scheme)
2. Existing building in operation or existing unoccupied building (BREEAM In-Use scheme)
3. Existing building de-construction (no BREEAM scheme for this life cycle stage at present)
4. Infrastructure projects (BREEAM infrastructure pilot scheme)
Scoring and rating BREEAM-assessed buildings
BREEAM rating benchmarks

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

1. The BREEAM rating level benchmarks
2. The minimum BREEAM standards
3. The environmental section weightings
4. The BREEAM assessment issues and credits

The next sections summarise how these elements combine to produce a BREEAM rating for a new building and are followed by a description and example calculation of a rating.

BREEAM rating benchmarks for projects assessed using the 2018 version of BREEAM UK New Construction are:

<table>
<thead>
<tr>
<th>BREEAM Rating</th>
<th>% score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Outstanding</td>
<td>≥ 85</td>
</tr>
<tr>
<td>Excellent</td>
<td>≥ 70</td>
</tr>
<tr>
<td>Very good</td>
<td>≥ 55</td>
</tr>
<tr>
<td>Good</td>
<td>≥ 45</td>
</tr>
<tr>
<td>Pass</td>
<td>≥ 30</td>
</tr>
<tr>
<td>Unclassified</td>
<td>&lt; 30</td>
</tr>
</tbody>
</table>

BREEAM rating benchmarks enable a client and all other stakeholders to compare the performance of a newly constructed building with other BREEAM rated buildings, and the typical sustainability performance of a stock of new non-domestic buildings in the UK.

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

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

BREEAM category weightings

Category weightings are fundamental to any building environmental assessment method providing a means of defining and ranking the relative impact of environmental issues. BREEAM uses an explicit weighting system to determine the overall BREEAM score.

This weighting system is defined in greater detail within the BRE Global Core Process Standard (BES 5.3.0.1) and it’s supporting procedural documents. The process for defining the weightings is set out in a briefing available on the BREEAM website. These form part of the over-arching BREEAM Standard and the Code for a Sustainable Built Environment.

<table>
<thead>
<tr>
<th>Environmental section</th>
<th>Weighting</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Fully fitted out</td>
</tr>
<tr>
<td>Management</td>
<td>11%</td>
</tr>
<tr>
<td>Health and Wellbeing</td>
<td>14%</td>
</tr>
<tr>
<td>Energy</td>
<td>16%</td>
</tr>
<tr>
<td>Transport</td>
<td>10%</td>
</tr>
<tr>
<td>Environmental section</td>
<td>Weighting</td>
</tr>
<tr>
<td>-----------------------------</td>
<td>----------------------</td>
</tr>
<tr>
<td></td>
<td>Fully fitted out</td>
</tr>
<tr>
<td>Water</td>
<td>7%</td>
</tr>
<tr>
<td>Materials</td>
<td>15%</td>
</tr>
<tr>
<td>Waste</td>
<td>6%</td>
</tr>
<tr>
<td>Land Use and Ecology</td>
<td>13%</td>
</tr>
<tr>
<td>Pollution</td>
<td>8%</td>
</tr>
<tr>
<td>Total</td>
<td>100%</td>
</tr>
<tr>
<td>Innovation (additional)</td>
<td>10%</td>
</tr>
</tbody>
</table>
Minimum standards

To ensure 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. The majority of BREEAM credits can, however, be traded, so non-compliance in one area can be offset through compliance in another to achieve the target BREEAM rating.

The minimum acceptable levels of performance for each rating are summaries in Table 5 below.

To achieve a particular BREEAM rating, the minimum overall percentage score must be achieved as well as the minimum standards detailed in Table 5 below.

Table 5 Minimum BREEAM standards by rating level

<table>
<thead>
<tr>
<th>BREEAM issue</th>
<th>Minimum standards by BREEAM rating level</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pass</td>
</tr>
<tr>
<td>Man 03</td>
<td>None</td>
</tr>
<tr>
<td>Man 04</td>
<td>None</td>
</tr>
<tr>
<td>Man 05</td>
<td>None</td>
</tr>
<tr>
<td>Ene 01</td>
<td>None</td>
</tr>
<tr>
<td>Ene 02</td>
<td>None</td>
</tr>
<tr>
<td>Wat 01</td>
<td>None</td>
</tr>
<tr>
<td>Wat 02</td>
<td>None</td>
</tr>
<tr>
<td>Mat 03</td>
<td>Criterion 1 only</td>
</tr>
<tr>
<td>Wst 01</td>
<td>None</td>
</tr>
<tr>
<td>Wst 03</td>
<td>None</td>
</tr>
</tbody>
</table>
BREEAM assessment issues and credits

BREEAM UK New Construction consists of individual assessment issues across nine environmental categories, plus a tenth ‘innovation’ category. Each assessment issue addresses a specific building related environmental impact or issue and is assigned a number of credits.

BREEAM credits are awarded where a development meets the best practice performance levels defined for an assessment issue, i.e. the impact has been mitigated. For example in the case of the health and wellbeing section, a specific building occupant-related issue has been addressed, e.g. thermal comfort.

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.

In addition to the category section score, 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. It is therefore possible to use the method to define performance levels in support of specific organisational policy objectives for individual environmental issues as well as using BREEAM to define overall targets. However, be aware that design flexibility and project cost implications can occur if design targets are set using individual issues and credit levels.

‘Credits’ for innovation

BREEAM seeks to support innovation within the construction industry and its supply chain. One way it does this is through the availability of additional credits to recognise sustainability related benefits or performance levels not currently recognised by standard BREEAM assessment issues and criteria. This rewards developments that go beyond best practice in a particular aspect of sustainability, i.e. demonstrated innovation.

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

Two ways in which BREEAM awards innovation credits:

1. By meeting exemplary performance criteria defined within an existing BREEAM issue, i.e. going beyond the standard BREEAM assessment criteria
2. By the project’s licensed BREEAM Assessor applying to BRE Global 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 ‘innovation credit’ can be awarded.

Each innovation credit achieved adds 1% to a building’s overall score. The maximum number of ‘innovation credits’ that can be awarded for any one building is 10; therefore the maximum additional score available for ‘innovation’ is 10%.

Innovation credits can be awarded regardless of the building’s final BREEAM rating, i.e. they can be awarded at any BREEAM rating level. Refer to Inn.01 Innovation on page 423 for more detail.
Calculating a building's BREEAM rating

A BREEAM Assessor must determine the BREEAM rating using the appropriate assessment tools and calculators and only a certified assessment can claim a BREEAM Rating. An indication of performance against the BREEAM scheme can be determined by anyone using a BREEAM Pre-Assessment Estimator available from the BREEAM website www.breeam.com.

The process of determining a BREEAM rating and an example calculation, see Table 6 below

1. For each of BREEAM's nine categories the number of credits awarded is determined by the BREEAM Assessor according to the number of credits available when the criteria of each assessment issue have been met (as detailed in the technical sections of this document).
2. The percentage of available credits achieved is calculated for each section.
3. The percentage of credits achieved in each section is multiplied by the corresponding weighting for each section to give the overall environmental category score.
4. The section scores are added together to give the overall BREEAM score.
5. The overall score is compared to the BREEAM rating benchmark levels and, provided all minimum standards have been met, the relevant BREEAM rating is achieved.
6. An additional 1% can be added to the final BREEAM score for each innovation credit achieved (up to a maximum of 10% with the total BREEAM score capped at 100%).

Table 6 Example BREEAM score and rating calculation

<table>
<thead>
<tr>
<th>BREEAM Section</th>
<th>Credits Achieved</th>
<th>Credits Available</th>
<th>% of Credits Achieved</th>
<th>Category weighting (fully fitted)</th>
<th>Section Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Management</td>
<td>10</td>
<td>21</td>
<td>52.38%</td>
<td>0.14</td>
<td>7.38%</td>
</tr>
<tr>
<td>Health and Wellbeing</td>
<td>14</td>
<td>22</td>
<td>63.64%</td>
<td>0.15</td>
<td>9.40%</td>
</tr>
<tr>
<td>Energy</td>
<td>16</td>
<td>31</td>
<td>51.61%</td>
<td>0.21</td>
<td>10.74%</td>
</tr>
<tr>
<td>Transport</td>
<td>10</td>
<td>12</td>
<td>83.33%</td>
<td>0.08</td>
<td>6.71%</td>
</tr>
<tr>
<td>Water</td>
<td>7</td>
<td>10</td>
<td>70.00%</td>
<td>0.07</td>
<td>4.70%</td>
</tr>
<tr>
<td>Materials</td>
<td>5</td>
<td>14</td>
<td>35.71%</td>
<td>0.09</td>
<td>3.36%</td>
</tr>
<tr>
<td>Waste</td>
<td>6</td>
<td>6</td>
<td>100.00%</td>
<td>0.04</td>
<td>4.03%</td>
</tr>
<tr>
<td>Land Use and Ecology</td>
<td>5</td>
<td>10</td>
<td>50.00%</td>
<td>0.07</td>
<td>3.36%</td>
</tr>
<tr>
<td>Pollution</td>
<td>8</td>
<td>13</td>
<td>61.54%</td>
<td>0.09</td>
<td>5.37%</td>
</tr>
<tr>
<td>Innovation</td>
<td>2</td>
<td>10</td>
<td>20.00%</td>
<td>0.07</td>
<td>1.34%</td>
</tr>
<tr>
<td>Final BREEAM score</td>
<td></td>
<td></td>
<td>56.38%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BREEAM Rating</td>
<td></td>
<td></td>
<td></td>
<td>VERY GOOD</td>
<td></td>
</tr>
</tbody>
</table>

Table 7 Minimum standards for a BREEAM Very Good rating

<table>
<thead>
<tr>
<th>Minimum standards for BREEAM 'Very Good' rating</th>
<th>Achieved?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ene 02 Energy monitoring on page clxxiii</td>
<td>Y</td>
</tr>
<tr>
<td>Wat 01 Water consumption on page cclx</td>
<td>Y</td>
</tr>
<tr>
<td>Wat 02 Water monitoring on page cclxxii</td>
<td>Y</td>
</tr>
<tr>
<td>Mat 03 Responsible sourcing of materials on page 307</td>
<td>Y</td>
</tr>
</tbody>
</table>
The BREEAM evidential requirements

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

Why does BREEAM require evidence?

BREEAM is a third party certification scheme operated in accordance with international standards to ensure it is applied in a consistent, impartial and robust manner. The BREEAM Assessor’s assessment report and the BRE Global Quality Assurance and certification process are core elements of BREEAM, and they are designed to ensure that clients can have confidence in the BREEAM rating determined by the assessor.

To maintain consistency and confidence certification requires that, all assessment decisions be based on verified and credible project information that can be traced, i.e. decisions are evidence based. This is not only important for compliance with the international standards to which BRE Global is accredited as a certification body, but also manages risk to clients and BREEAM Assessors in the event that a certification outcome is challenged.

The assessment report and the BREEAM Assessor role

The role of the BREEAM Assessor is to gather project information in a competent and impartial manner and use it to assess performance against the BREEAM scheme. 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 their assessment submissions and made available to BRE Global Ltd for quality assurance checks.

Clear, ordered and well referenced evidence for each BREEAM issue and criterion addressed facilitates efficient quality assurance and a certification decision. BREEAM Assessors can access further guidance on assessment referencing in Assessor Guidance Note 01, and the ‘Reporting process’ webinar, both available from the Resources section of the BREEAM Projects website.

The BREEAM Assessor determines the BREEAM rating and their submitted assessment report 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. For this reason, BREEAM aims to avoid being prescriptive on the type of evidence required, although some issues do require specific documents to be provided.

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.

To help project teams and the BREEAM Assessor understand how the different types of building information documentation they collate can be used as evidence at each stage of assessment, the evidence types are grouped broadly into three categories:

1. General evidence type
2. Specific evidence type
3. Other evidence type.

For some assessment issues, the assessor will require a mixture of general and specific evidence types.

General evidence includes a broad list of defined building information commonly produced for a building project. One or more pieces of this type of information can be used to demonstrate compliance for one or more of the assessment issues and criteria, as deemed appropriate by the BREEAM Assessor for the stage of assessment.

General BREEAM evidence types are listed in Table 9 on page 41, and not specifically in the Evidence section within each BREEAM issue. Not all general evidence types will be appropriate for all assessment issues and it is the
responsibility of the assessor to ensure that the evidence specifically demonstrates compliance and is fully referenced in the assessment submission.

Specific evidence is particular building information that must be provided to verify compliance with the relevant criteria for the BREEAM credit sought. In all cases this is the only type of evidence acceptable to BRE Global Ltd for that particular issue or criteria. If the specific evidence is not provided and referenced appropriately in the assessment submission, the Quality Assurance audit will identify it is a non-conformance and a certification decision will be delayed until such time as the non-conformance is addressed. An example of specific evidence is a copy of the Building Regulations output document from the approved software for BREEAM issue Ene 01 which is listed in the evidence table for this issue.

When required, specific evidence is defined and listed in the Evidence section of the assessment issue for both interim and final stages of assessment. Specific evidence required to demonstrate compliance with particular criteria is listed but this evidence alone may not be sufficient to demonstrate full compliance. Additional general evidence types may also be required. For example for Mat 01; to demonstrate compliance with criteria 1–5 at the design stage, a copy of the Mat 01 Calculator tool is listed in the ‘Evidence’ table. However, in addition to the Mat 01 Calculator tool, further evidence is required to demonstrate how the inputs for this tool have been determined, i.e. general evidence types such as building specifications or drawings etc., confirming the material specifications to be used. Not all BREEAM issues have specific evidence requirements.

Other types of evidence provided by a client or design team not listed in Table 9 on page 41 or the ‘Evidence’ section for each issue, can still be used. To avoid non-conformities and delays in certification, other types of evidence must be credible, robust and traceable to the same assurance level as, or better than, specified or general evidence types defined in the technical manual. If in doubt, BRE should be contacted prior to awarding credits and referencing such evidence in the submission for QA and certification decision.

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 does 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 not unreasonable to expect formal design or specification information to be available to confirm compliance.

Written commitments at the final stage of assessment – post-construction

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 be reflective of 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 as-built drawings showing the location of the sub-meters.

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.

Evidence principles that BREEAM Assessors and the BRE Global Ltd Quality Assurance work to

Where specific evidence is in the ‘evidence’ table within each assessment issue, this must be sourced and verified by the BREEAM Assessor.

Where no specific evidence is listed, this means there are potentially a number of different types of ‘general’ project information, as per Table 9 on the facing page that the BREEAM Assessor can source and use to demonstrate compliance.

To determine whether general evidence types are appropriate for an assessment issue, the BREEAM Assessor must consider the BREEAM evidence principles see BREEAM evidence principles below. Where the ‘general evidence types’ meet the principles outlined in Table 8 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 8 BREEAM evidence principles

<table>
<thead>
<tr>
<th>Principle</th>
<th>Objective</th>
<th>A question to ask to check</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 - Evidence for all criteria and all credits sought</td>
<td>Completeness</td>
<td>Are all criteria covered? Have all relevant compliance notes and definitions been addressed?</td>
</tr>
<tr>
<td>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 Ltd.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 - Unambiguous assessment</td>
<td>Independent review compatibility</td>
<td>Would a third party (e.g. BRE Global Ltd) come to the same assessment decision as me based on the evidence submitted?</td>
</tr>
<tr>
<td>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.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 - Robust</td>
<td>Proof that evidence is robust and from a reliable source</td>
<td>Using an assessor’s judgment, 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?</td>
</tr>
<tr>
<td>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. (see Robustness of Evidence on the facing page for further details on both of the above)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Principle

#### 4 - Use existing evidence

<table>
<thead>
<tr>
<th>Principle</th>
<th>Objective</th>
<th>A question to ask to check</th>
</tr>
</thead>
<tbody>
<tr>
<td>Use existing project information to demonstrate compliance. In most cases evidence should not need to be ‘created’ for BREEAM compliance purposes.</td>
<td>Minimises evidence and reduces time and cost of compliance</td>
<td>Does an existing type of project information robustly demonstrate compliance for the credits sought?</td>
</tr>
</tbody>
</table>

### 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?

Any evidence submitted for a BREEAM assessment must be robust in terms of its source and its traceability. The minimum information the assessor must expect to see when certain types of evidence are submitted is:

- **Communication records**: Any communication records used as evidence must provide clear confirmation of the site name, author's identity and role, the date and recipients identity.

- **Formal letters of correspondence**: On company or organisation headed note-paper with a signature (electronic signatures are acceptable). Ideally letters should be a secured document. (Please see sections relating to written commitment for further information.)

- **Meeting minutes**: Include date, location and attendee information (names, organisations and roles), along with a record of the meeting and agreed actions.

- **Drawings**: All drawings have the building or site name, phase (if applicable), title of drawing, date, revision number and a scale.

- **Specification**: A specification clearly relates to the project under assessment, and it has a date and revision number. Where sections of a specification are provided the assessor should reference the extract and as a minimum submit the front page of the specification detailing the project name, revision number and date.

- **Site inspection report**: A site inspection report includes the building or site name, date, author and summary text to detail what was witnessed, confirming compliance. Photographic evidence can be used to support the text in the report.

For other types of evidence not listed, the assessor should use this minimum information list as a guide to suitable evidence. As a minimum the evidence used to assess compliance must contain key information such as the project name, the author, date, revision numbers etc.

### Table 9 General evidence types

<table>
<thead>
<tr>
<th>Ref</th>
<th>Document or evidence type</th>
<th>Description and notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>E1</td>
<td>As constructed information</td>
<td>Information produced at the end of a project to represent what has been constructed. This will comprise a mixture of ‘as-built’ information or drawings and surveys from specialist subcontractors and the ‘final construction issue’ from design team members.</td>
</tr>
<tr>
<td>E2</td>
<td>Building information model (BIM)</td>
<td>The BIM (or BIM files) used for the project containing relevant information or evidence of compliance.</td>
</tr>
<tr>
<td>E3</td>
<td>BRE Global correspondence reference number</td>
<td>For example the reference number for a BRE Global response to an assessor’s technical query.</td>
</tr>
</tbody>
</table>
| E4  | BREEM Assessor’s site inspection | A formal report based on the BREAM Assessor’s own survey of the site or building to confirm compliance with BREAM criteria. An assessor’s site
<table>
<thead>
<tr>
<th>Ref</th>
<th>Document or evidence type</th>
<th>Description and notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>report</td>
<td>inspection report will be distinct from their formal BREEAM assessment report, serving as a form of evidence of compliance in its own right, and it may include photographs taken by the assessor as part of the survey.</td>
<td></td>
</tr>
<tr>
<td>E5</td>
<td>Building contracts</td>
<td>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.</td>
</tr>
<tr>
<td>E6</td>
<td>Certificates of compliance (third party)</td>
<td>Examples include ISO 14001, BES 6001, FSC (Forest Stewardship Council), EPC (environmental profile certificate), EPD (environmental product declaration), Considerate Constructors etc.</td>
</tr>
<tr>
<td>E7</td>
<td>Communication records</td>
<td>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).</td>
</tr>
<tr>
<td>E8</td>
<td>Communication strategy</td>
<td>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 formally and at information exchanges.</td>
</tr>
<tr>
<td>E9</td>
<td>Computer aided modelling results and outputs</td>
<td>Examples include thermal modelling, flooding, life cycle assessment, life cycle costing, ventilation modelling etc.</td>
</tr>
<tr>
<td>E10</td>
<td>Construction specification</td>
<td>The specification for the project or building.</td>
</tr>
<tr>
<td>E11</td>
<td>Construction stage data and information</td>
<td>For example, purchase orders, metering data, log books, commissioning records, reports etc.</td>
</tr>
<tr>
<td>E12</td>
<td>Contractual tree</td>
<td>A diagram that clarifies the contractual relationship between the client and the parties undertaking the roles required on a project.</td>
</tr>
<tr>
<td>E13</td>
<td>Cost information</td>
<td>Project costs, including the cost estimate and life cycle costs.</td>
</tr>
<tr>
<td>E14</td>
<td>Design drawings</td>
<td>Developed Design and Technical Design, including the coordinated architectural, structural and building services design. Site plans, drainage designs.</td>
</tr>
<tr>
<td>E15</td>
<td>Design programme</td>
<td>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.</td>
</tr>
<tr>
<td>E16</td>
<td>Design responsibility matrix</td>
<td>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.</td>
</tr>
<tr>
<td>E17</td>
<td>Feasibility study</td>
<td>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.</td>
</tr>
<tr>
<td>E18</td>
<td>Final project brief</td>
<td>The Initial Project Brief amended so that it is aligned with the Concept Design and any briefing decisions made during this stage.</td>
</tr>
<tr>
<td>E19</td>
<td>Other third party information</td>
<td>For example, maps, public transport timetables, product data or details, manufacturers’ literature, government or EU standards or codes, EU labelling.</td>
</tr>
<tr>
<td>E20</td>
<td>Professional services contract</td>
<td>An agreement to provide professional or consulting services such as designing, feasibility studies, or legal or technical advice.</td>
</tr>
<tr>
<td>E21</td>
<td>Professional specialist reports</td>
<td>Professional reports resulting from specialist surveys, studies or test results, e.g. contaminated land, ecology, flood risk assessment, surface</td>
</tr>
<tr>
<td>Ref</td>
<td>Document or evidence type</td>
<td>Description and notes</td>
</tr>
<tr>
<td>-----</td>
<td>----------------------------</td>
<td>-----------------------</td>
</tr>
<tr>
<td>E22</td>
<td>Project Execution or Quality Plan</td>
<td>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.</td>
</tr>
<tr>
<td>E23</td>
<td>Project programme</td>
<td>The overall period for the briefing, design, construction and post completion activities of a project.</td>
</tr>
<tr>
<td>E24</td>
<td>Project roles table</td>
<td>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.</td>
</tr>
<tr>
<td>E25</td>
<td>Project strategy</td>
<td>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.</td>
</tr>
<tr>
<td>E26</td>
<td>Risk assessment</td>
<td>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.</td>
</tr>
<tr>
<td>E27</td>
<td>Schedule of services</td>
<td>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.</td>
</tr>
<tr>
<td>E28</td>
<td>Strategic or initial project brief</td>
<td>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.</td>
</tr>
</tbody>
</table>
| E29 | BREEAM AP output | Examples of evidence that could be used to demonstrate compliance with some of the requirements of the BREEAM AP related criteria (in Man 01 and Man 03) 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 |
| E30 | Responsible construction management documentation | Examples of evidence that satisfy criteria 1 to 6 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  
- Statement of confirmation by the 'dedicated person on site'  
- Training records  
- Photographic evidence  
- Records of communication with the neighbouring community  
- Contracts or formal agreements  
- Reporting documents and logs  
- Reporting procedures  

Evidence produced by third party schemes (e.g. CCS monitor’s report, FORS, CLOCS, Yellow Jacket documentation). |
Management

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

Category summary table
Man 01 Project brief and design 4 credits
- Encouraging an integrated design process, considering BREEAM performance targets early, to influence decision-making and optimise building performance, while avoiding unnecessary costs.

Man 02 Life cycle cost and service life planning 4 credits
- Promoting the business case for sustainable buildings through the enhanced understanding of capital cost.
- Improving design, specification, maintenance and operation, by encouraging the use of life cycle costing.

Man 03 Responsible construction practices min standards 6 credits
- Encouraging construction sites to be managed in an environmentally and socially considerate and responsible manner.
- Monitoring encourages continuous improvements and utility consumption reduction.

Man 04 Commissioning and handover min standards 4 credits
- Encouraging a well-managed handover and commissioning process, which will ensure building services and fabric defects are identified and rectified.
- The building responds to the needs of the occupants.

Man 05 Aftercare min standards 3 credits
- Encouraging aftercare support during the first year of the building operation, to ensure the building operates in accordance with the design intent and in response to the building occupants’ needs.
Man 01 Project brief and design

Aim

To optimise final building design through recognising and encouraging an integrated design process and robust stakeholder engagement.

Value

- Identification of variation in stakeholder needs, so maximising benefits and acceptability of the project in operation to users and those affected by it.
- Enhanced project team integration and efficiency.
- Helping to achieve project targets and maximise opportunities for project performance.
- Minimise risks to project performance, delays and cost arising as a result of ongoing design development and project changes.
- Help to meet performance expectations in operation and so minimise the risks of a performance gap.

Context

Early stakeholder engagement ensures that key project stakeholders are identified and engaged to determine end user requirements and operational adaptability, allowing them to be taken into account throughout the project.
Research highlights that when project stakeholders are not satisfied with the project management quality of the final project, the project team will need to adjust the scope, time and cost to meet stakeholder requirements and expectations on quality issues.

Adopting integrated design and engagement processes has been demonstrated to result in improved operational performance, greater project efficiencies and reduced risks to performance, time and cost.

Following an integrated design process, maximises the opportunities for performance and minimises risks of design conflicts appearing later on in a project when risks to time and cost are higher.

### Assessment scope

<table>
<thead>
<tr>
<th></th>
<th>Fully fitted</th>
<th>Simple building</th>
<th>Shell and core</th>
<th>Shell only</th>
</tr>
</thead>
<tbody>
<tr>
<td>Applicable Assessment criteria</td>
<td>All</td>
<td>1–7</td>
<td>All</td>
<td>All</td>
</tr>
<tr>
<td>Assessment type specific notes</td>
<td>None</td>
<td>9–10 (1 exemplary credit)</td>
<td>11–12 (1 exemplary credit)</td>
<td>None</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Assessment type specific</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Building type specific</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.0 Education, Healthcare, Law courts and Major Transport hub building types <a href="#">See criterion 8.</a></td>
</tr>
</tbody>
</table>
This issue is split into two parts:
- Stakeholder consultation (two credits)
- BREEAM Advisory Professional (AP) (two credits).

One credit - Stakeholder consultation (project delivery)
1 Prior to completion of the Concept Design (RIBA Stage 2 or equivalent), the project delivery stakeholders (see Definitions on page I) meet to identify and define for each key phase of project delivery:
   1.a: Roles
   1.b: Responsibilities
   1.c: Contributions.
2 Consider each one of the following items when defining roles, responsibilities and contributions for each key phase of the project:
   2.a: End user requirements
   2.b: Aims of the design and design strategy
   2.c: Particular installation and construction requirements or limitations
   2.d: Occupiers' budget and technical expertise in maintaining any proposed systems
   2.e: Maintainability and adaptability of the proposals
   2.f: Requirements for the production of project and end user documentation
   2.g: Requirements for commissioning, training and aftercare support.
   Where the building occupants are not known, the list of considerations above still applies. The appropriate project delivery stakeholder considers each item, based on likely scenarios of building occupancy.
3 The project team demonstrates how the project delivery stakeholders' contributions and the consultation process outcomes influence the following:
   3.a: Initial Project Brief
   3.b: Project Execution Plan (see Definitions on page I)
   3.c: Communication Strategy (see Definitions on page I)
   3.d: Concept Design.

One credit - Stakeholder consultation (interested parties)
4 Prior to completion of the Concept Design stage, the design team consult with all interested parties (see Definitions on page I) on matters that cover the minimum consultation content (see Methodology).
5 Relevant members of the design team organise a design workshop focusing on operational energy (see Energy Reduction of energy use and carbon emissions on page clxi).

6 Demonstrate how the stakeholder contributions and consultation exercise outcomes influence the Initial Project Brief and Concept Design.

7 Prior to completion of the detailed design (RIBA Stage 4, Technical Design or equivalent), all interested parties (see Definitions on page clxi) give and receive consultation feedback.

Additionally for Education, Healthcare, Law courts and Major transport hub building types only:

8 An independent party (see Definitions on page clxi) carries out the consultation exercise. As an example, the Design Quality Indicator (DQI) could be used as a method to assess the design quality of buildings.

Prerequisite for BREEAM Advisory Professional credits (Concept and Developed Design)

9 The project team, including the client, formally agree strategic performance targets (see Definitions on page clxi) early in the design process (with the support of the BREEAM AP where appointed).

One credit - BREEAM AP (Concept Design)

10 Involve a BREEAM AP in the project at an appropriate time and level to:

10a 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 stage.

10b Monitor progress against the performance targets (see Definitions on page clxi) agreed under criterion 9 above throughout all stages after their appointment where decisions critically impact BREEAM performance.

10c Proactively identify risks and opportunities related to the achievement of the targets agreed under criterion 9 above.

10d Provide feedback to the project team as appropriate, to support them in taking corrective actions and achieving their agreed performance targets.

10e Monitor and, where relevant, coordinate the generation of appropriate evidence by the project team.

One credit - BREEAM AP (Developed Design)

11 Criteria 9 and 10 above are achieved.

12 Involve the BREEAM AP in the project at an appropriate time and level to:

12a 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 the Developed Design stages.

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

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

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

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

Compliance notes are located in Appendix G – Notes for compliance on page 18 for the consultation. These compliance notes will be available through the knowledge base when the scheme goes live.

Methodology

Minimum consultation content

The minimum consultation content (see criterion on page xvi) of the consultation plan is dependent on the building, but typically includes:

1. Functionality, build quality and impact (including aesthetics).
2. Provision of appropriate internal and external facilities (for future building occupants and visitors or users).
4. Maintenance resources implications.
5. Impacts on the local community, e.g. local traffic or transport impact.
6. Opportunities for shared use of facilities and infrastructure with the community or appropriate stakeholders.
7. Compliance with statutory (national or local) consultation requirements.
8. Inclusive and accessible design.

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

9. How the building or grounds could best be designed to facilitate learning and provide a range of social spaces appropriate to the needs of pupils, students and other users.

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

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

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

11. How to ensure a smooth, safe and secure transition between different modes of transport (air, rail, road, bike and pedestrian).

Monitoring progress and providing feedback

In order to monitor progress and provide feedback, the BREEAM AP must attend key meetings (see Definitions on the next page) with the project team during the Concept Design, Developed Design and Technical Design stages, as defined by the RIBA Plan of Work 2013.

The role of the BREEAM AP

The AP does not have to be the same person throughout the process. However, they need to keep records of targets, reasons behind decisions, risks etc. and make sure these are handed over if a new AP joins the team.

Early in the design process

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

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Interim design stage</th>
<th>Final post-construction stage</th>
</tr>
</thead>
<tbody>
<tr>
<td>All</td>
<td>One or more of the appropriate evidence types listed in The BREEAM evidential requirements on page 38 can be used to demonstrate compliance with these criteria.</td>
<td>As per interim design stage.</td>
</tr>
<tr>
<td>4, 7</td>
<td>Consultation plan setting out the process and scope of the consultation.</td>
<td>As per interim design stage.</td>
</tr>
<tr>
<td>9–12</td>
<td>See E29 in The BREEAM evidential requirements ◊Table 8 on page 40</td>
<td>As per interim design stage.</td>
</tr>
</tbody>
</table>

Definitions

Communication strategy
The RIBA Plan of Work 2013 defines the Communication Strategy as 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.

Concept design
The objective at this stage is to develop outline proposals including site and spatial planning, building form, structural and building services strategies, outline specifications, preliminary cost budgets including relevant project strategies which support or influence the design programme and the ability to comply with BREEAM requirements as the project progresses.
Activities can include: preparing the sustainability strategy, maintenance and operational strategy, handover strategies, carrying out risk assessments, reviewing the project programme, considering construction logistics to ensure efficiency, developing health and safety strategy, undertaking any third party consultations as required and any research and development aspects.

Consultation feedback
This feedback focuses on the stakeholders' suggestions, comments, recommendations and the consultation outcomes. It includes how the suggestions and outcomes influenced, or resulted in modifications to the proposed design and building operation or use.

Developed Design
The objective at this stage is to develop detailed design proposals for built form, layout, constructional and structural design, building services systems, specifications and cost information based on the concept design and project strategies. Activities can include: reviewing and updating the sustainability strategy, maintenance and operational strategy, handover strategies, risk assessments, construction logistics and health and safety strategies, undertaking any third party consultations as required and concluding any research and development aspects in accordance with the design.
Formally agree

The term ‘formally agreed’ relates to performance targets. Examples of formal agreements include a contract or letters of appointment with the architect and with other relevant project team members.

Independent party

A third-party, a person or body internal to a party involved (parties involved are typically a supplier (1st party) or purchaser (2nd party)), who shall not be involved in the issue in question, and shall not have conflicts of interests resulting from their position. To comply with the criterion relating to the use of an independent party, the client or design team needs to demonstrate either:

1. They have used a party independent of the design process to conduct the necessary consultation exercise; 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.

Interested parties

This includes but is not limited to:

1. Actual or intended building users (if known) including facilities management staff or those responsible for the day-to-day operation of the building and grounds.
2. 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.
3. Existing partnerships and networks that have knowledge of, and experience working on, existing buildings of the same type.
4. Potential users of any shared facilities, e.g. operators of clubs and community groups.

AND the following where relevant:

5. In educational building types, representatives of local education Authorities, board of governors etc.
6. Local or national historic or heritage groups (over and above any requirements relating to statutory consultees).
7. Specialist service and maintenance contractors or representatives where the building function has particular technical requirements in complex environments, e.g. buildings containing laboratories.
8. For stations, passenger focus groups, train and station operations groups.

See criterion 7 on page xlviii

Key meetings with the project team

Key meetings are defined as those where fundamental decisions that influence or affect the building’s proposed design and its construction are discussed and made. These decisions are also expected to have a direct and significant impact to the building’s sustainability credentials and performance. These meetings might include:

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. Environmental consultants
8. Project management consultants.
Key phases

The key phases of project delivery are:

- Concept Design
- Developed Design
- Construction
- Commissioning and Handover
- In-Use occupation.

Performance targets

Performance targets refer to the BREEAM rating and minimum standards required. Where appropriate, performance targets can be related to individual BREEAM credits. However, performance targets may also involve other targets related to issues covered in BREEAM assessments, e.g. energy, health and wellbeing.

Project delivery stakeholders

The purpose of criterion 1 on page xvi is to reflect the need to consider the input of all major project stakeholders from the earliest practical stage, to ensure smooth and successful delivery of the project’s sustainability objectives. Project delivery stakeholders include the client, the building occupier (where known), the design team and the principal contractor. Contractors’ involvement ensures their input in terms of formulating sustainable design solutions, commenting or inputting on the practicality and buildability of (one or more) design solutions and their impact on programming, cost etc. BREEAM recognises that traditionally for some projects, the contractor for the works is not appointed at the early project stages and therefore compliance with this criterion would not be possible. In these instances, to ensure the aim of the criteria is upheld, the criterion is met if a suitably experienced person with substantial construction or contracting experience in projects similar to the proposed works is involved prior to appointment of the contractor. A suitably experienced person could be a contractor appointed as a consultant for this stage or a construction project manager.

Project Execution Plan

The RBA Plan of Work 2013 defines a Project Execution Plan as a plan produced in collaboration between 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. It is sometimes referred to as a ‘project quality plan’.

Project team

The composition of the project team may change through the duration of a project and may include several members. This includes but is not limited to the client, the design teams, contractors etc.

Strategic performance targets

Strategic performance targets are set early in the design process. They cover generally the same areas as those identified in ‘performance targets’ (see Definitions on page I), however they can be set at a more strategic level, defining aspirations and project performance objectives more broadly compared to the performance targets.

Third party

A person or body that is recognised as being independent of the parties involved (parties involved are typically a supplier (1st party) or purchaser (2nd party)), as concerns the issue in question.
Additional information

BREEAM Advisory Professional and existing Accredited Professionals and Site Sustainability Managers

All current BREEAM Accredited Professionals will automatically be qualified as BREEAM Advisory Professionals and will be able to carry out their work under the title of 'BREEAM Advisory Professional Design and Site' under the new scheme. Existing Site Sustainability Managers, likewise, will automatically be qualified as BREEAM Advisory Professionals and will be able to continue to carry out their work under the title of 'BREEAM AP Site'.

The value of the BREEAM AP

The BREEAM AP can be called on and provide 'scheme related' expertise 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.

An AP can work for a construction organisation frequently undertaking BREEAM related work. Moreover, the BREEAM AP can be the same person as the BREEAM Assessor. This allows flexibility and versatility of their role.

Cost efficiencies are expected where the appointed licensed assessor also acts as the BREEAM AP for a project.

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

Soft Landings Framework

A framework written and produced by Usable Buildings Trust (UBT) and Building Services Research and Information Association (BSRIA)(9) that seeks to promote improved briefing, design, handover and building performance in-use. Embedding the principles of this framework within a project should ensure that the evidence is available to demonstrate compliance with particular aspects of the criteria under this BREEAM issue. Please also note that BSRIA has produced a BREEAM New Construction or Soft Landings interpretation note(10) for clients and design teams.

The Government Soft Landings (GSL) is a version of the Soft Landings concept tailored for use on public sector related projects to link in with the work of the government's Building Information Modelling Task Group. It is expected to be mandated alongside building information modelling (BIM) Level 2 and is to be implemented by central government departments. It should be noted that the GSL programme will become compulsory for local government developments. Further information is available from: www.bimtaskgroup.org.
Man 02 Life cycle cost and service life planning

Fully fitted  Simple building  Shell & core  Shell only  No Minimum standards

Aim

To promote the business case for sustainable buildings and to deliver whole life value by encouraging the use of life cycle costing to improve design, specification, through-life maintenance and operation.

Value

- Provide greater confidence in future operational and maintenance costs.
- Focus design decision-making on whole life costs throughout the project.
- Facilitate robust funding proposals and help to make the business case for projects.
- Increase long term asset value.
- Support potential tenants by providing credible information on the maintenance and operational costs of a building when choosing a property.
- Capital cost reporting provides invaluable feedback into the design process improving future design decisions and helping to reinforce the business case for more sustainable buildings.

Context

Property procurement decisions are predominantly made on the basis of upfront capital cost and a lack of understanding of operational factors affecting cost, performance and satisfaction. Life cycle costing (LCC) is well established in many sectors as a means of improving the consideration of operational and maintenance factors
throughout the procurement process. It is becoming part of Government policy for public sector procurement, as emphasised in the UK Construction 2025(11) strategy document. This is related to great financial and time-related benefits: the construction industry and Government jointly aspire to achieve a 33% reduction in both the initial cost of construction and the life cycle cost of assets.

Assessment scope

<table>
<thead>
<tr>
<th></th>
<th>Fully fitted</th>
<th>Simple building</th>
<th>Shell and core</th>
<th>Shell only</th>
</tr>
</thead>
<tbody>
<tr>
<td>Applicable assessment criteria</td>
<td>All</td>
<td>6</td>
<td>All</td>
<td>All</td>
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<tr>
<td>Assessment type specific notes</td>
<td>None</td>
<td>None</td>
<td>see ref. 1.0</td>
<td>see ref. 1.0</td>
</tr>
</tbody>
</table>

**Assessment type specific**

1.0 Component level LCC plan must include all component types installed by the developer.

**Building type specific**

2.0 **Law court buildings** Responsibility for complying rests with any or all of the project team and is likely to vary depending on the procurement route used. The project team includes the Ministry of Justice.
Man 02 Life cycle cost and service life planning

Assessment criteria

This issue is split into three parts:

- Elemental life cycle cost (LCC) (two credits)
- Component level life options appraisal (one credit)
- Capital cost reporting (one credit)

Credits for each one of the three parts are awarded independently from one another.

Two credits - Elemental LCC
1. Carry out an outline, entire asset LCC plan at Process Stage 2 (equivalent to Concept Design - RIBA Stage 2) together with any design options appraisals in line with 'Standardised method of life cycle costing for construction procurement' PD 156865: 2008(12).
2. The elemental LCC plan:
   2.a: Provides an indication of future replacement costs over a period of analysis as required by the client (e.g. 20, 30, 50 or 60 years);
   2.b: Includes service life, maintenance and operation cost estimates.

The study period should ideally be agreed by the client, in line with the design life expectancy of the building. However, where the life expectancy of the building 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 (in line with the UK default).

3. Demonstrate, using appropriate examples provided by the design team, how the 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. Develop a component level LCC options appraisal by the end of Process Stage 4 (equivalent to Technical Design – RIBA Stage 4) in line with PD 156865: 2008. The component level LCC includes (where present):
   4.a: Envelope, e.g. cladding, windows, or roofing
   4.b: Services, e.g. heat source cooling source, or controls
   4.c: Finishes, e.g. walls, floors or ceilings
   4.d: External spaces, e.g. alternative hard landscaping, boundary protection.

The Component level LCC option appraisal should review all of the above component types (where present). However, you do not need to consider every single example cited under each component; only a selection of those most likely to draw valued comparisons. This is to ensure that a wide range of options are considered and help focus the analysis on components which would benefit the most from appraisal.

5. Demonstrate, using appropriate examples provided by the design team, 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

Report via BREEAM Projects the capital cost for the building in pounds per square metre of internal floor area (£k/m²). See also Methodology below and Additional information on page 16.

Compliance notes
Compliance notes are located in Appendix G – Notes for compliance on page 18 for the consultation. These compliance notes will be available through the knowledge base when the scheme goes live.

Methodology

Appropriate LCC examples

The options selected to minimise life cycle costs and maximise critical value, shall be appropriate in terms of their relative impact on project costs, future building maintenance burden and size (volume or area) and the project stage of the project (see criteria 3 and 5 on the previous page).

At stage 2, when considering the outputs from the elemental LCC plan, examples could be in the form of elemental appraisals (where appropriate), evolutions in concept design to reduce maintenance or replacement costs or contracts for further elemental analysis.

At stage 4, when considering the outputs from the component level option analysis, examples are likely to be in the form of component specifications coupled with justifications for their selection (i.e. how they reduce life cycle costs or maximise critical value).

BSRIA Guide BG 67/2016 provides examples on identifying alternative solutions, calculating their life cycle costs and interpreting the results.

The professional guidance note by RICS on LCC(13) summarises what is LCC and whole life costing service for both new construction works and for the refurbishment of existing assets.

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.

Pre-defined specifications

Where the building is constructed to a pre-defined standard specification, use the LCC elemental plan for this specification to help demonstrate compliance.

Evidence

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Interim design stage</th>
<th>Final post-construction stage</th>
</tr>
</thead>
<tbody>
<tr>
<td>All</td>
<td>One or more of the appropriate evidence types listed in The BREEAM evidential...</td>
<td></td>
</tr>
<tr>
<td>Criteria</td>
<td>Interim design stage</td>
<td>Final post-construction stage</td>
</tr>
<tr>
<td>----------</td>
<td>----------------------</td>
<td>------------------------------</td>
</tr>
<tr>
<td>1, 2 and 3</td>
<td>Elemental LCC plan.</td>
<td>As per interim design stage.</td>
</tr>
<tr>
<td>4 and 5</td>
<td>Component level LCC options appraisal plan.</td>
<td>As per interim design stage.</td>
</tr>
<tr>
<td>6</td>
<td>Predicted capital costs via BREEAM Projects.</td>
<td>Capital costs via BREEAM Projects.</td>
</tr>
</tbody>
</table>

**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 related to land procurement, clearance, design, statutory approvals and post occupancy aftercare are not included.

**Component level LCC options appraisal**

A component level LCC options appraisal is commonly used for cost planning specification choices of systems or component levels during design development. Component level LCC options appraisal for service life planning requires the environment of the building and other local conditions to be identified and the fundamental requirements to be met in planning the service life of the building. 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.

**Elemental LCC plan**

This is commonly used for developing solutions at project level during options 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 floor area (GIFA) and presented for elemental analysis, aligned to the level of capital cost plans.

**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**

**BSRIA Guide BG 67/2016**

BSRIA Guide BG 67/2016 on Life Cycle Costing presents a practical approach 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 of considering alternative solutions, calculating and fine-tuning life cycle costs, as well as interpreting the results of this analysis.

**Capital cost reporting**

The lack of data related to capital and life cycle costs and benefits arising from more sustainable building design presents a major barrier to the uptake of more sustainable solutions. This part of the issue seeks to encourage the sharing of data to break down these barriers and to 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, to inform the business case for sustainability and the ongoing development of BREEAM. All data submitted will be treated as confidential and will only be used anonymously.

**When to undertake LCC**

LCC is relevant throughout the constructed asset’s life cycle, in particular during the project planning, design and construction and also during the in-use phases. For further information please refer to guide PD 156865: 2008.

**Standardised method for life cycle costing (SMLCC) for construction**

The guide PD 156865: 2008 describes the SMLCC for construction procurement. The objectives of this guide are to provide:

1. A UK standard cost data structure for LCC, which aligns with BS ISO 15686-5 and with the Building Cost Information Service (BCIS) Standard Form of Capital Cost Analysis (SFCA) and industry recognised occupancy cost codes. (Refer to Annexes A, B and C; [www.rics.org](http://www.rics.org)).
2. LCC practitioners with a standardised method of applying LCC, applicable to the UK construction industry and to the key stages of the procurement process.
3. Process mapping the LCC stages – to help structure how to plan, generate, and interpret and present the results for a variety of different purposes and levels of life cycle cost planning.
4. Instructions on how to define the client’s specific requirements for LCC and the required outputs and forms of reporting – and to decide on which method of economic evaluation to apply.
5. Simplification and demystification – by providing practical guidance, instructions and definitions, together with informative worked examples on how to undertake LCC (for construction).
6. An industry accepted methodology, to facilitate a more accurate, consistent and robust application of LCC estimation and options appraisals, thereby creating a more effective and robust basis for LCC analysis and benchmarking. The guide PD 156865: 2008 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. For further information, please refer to PD 156865: 2008.
Man 03 Responsible construction practices

Aim

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

Value

- Prevent risks and liabilities arising from pollution to the surrounding areas during construction activities.
- Improve the safety of vehicle deliveries to and around a site.
- Improve on-site and off-site health and safety, including road safety.
- Improve project efficiency and understanding of construction performance through continuous construction progress monitoring.
- Improve understanding of construction impacts and resources helping to enhance resource efficiency on current and future projects.

Context

Adoption of more responsible construction practices can lead to a wide range of environmental, social and financial benefits.

Building construction activities create many local ground, water and air quality pollution risks affecting workers on site as well as others in the surrounding area. These can lead to significant liabilities on contractors and their clients. Preventing pollution during construction is hence a major priority.
The health and safety of the site operatives is a major concern within the construction sector. Within the UK construction sector, 43 workers were fatally injured in 2015/16 and 66,000 non-fatal workplace injuries were reported. Mental health is also a major cause of sickness and lost productivity in the construction sector with a CIOB survey indicating almost a third of respondents felt that stress at work was impacting on their health and wellbeing. In addition to the human cost of unaddressed mental health issues, there is also a financial one, with absences due to sickness costing British businesses £26bn a year in lost productivity. But construction also impacts on health and safety off site: approximately 19% of cyclist and 15% of pedestrian fatalities in the UK\(^{(15)}\) involve large goods vehicles over 3.5 tonnes many of which are related to construction traffic.

Monitoring health and safety procedures, resources, construction progress and site conditions is valuable in informing construction practices and maximising project performance.

### Assessment scope

<table>
<thead>
<tr>
<th>Fully fitted</th>
<th>Simple building</th>
<th>Shell and core</th>
<th>Shell only</th>
</tr>
</thead>
<tbody>
<tr>
<td>Applicable assessment criteria</td>
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<td></td>
<td></td>
<td>24.b see ref. 1.0</td>
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</tr>
</tbody>
</table>

**Assessment type specific**

1.0 As a minimum, construction waste transport covers inert materials, metals and mixed waste groups.

**Building type specific**

None
Man 03 Responsible construction practices

Assessment criteria

This issue is split into four parts:

– Environmental management (one credit)
– BREEAM Advisory Professional (AP) (site) (one credit)
– Responsible construction management (up to two credits)
– Monitoring of construction site impacts (up to two credits)

Prerequisite - Legally harvested and traded timber
1 All timber and timber-based products used during the construction process of the project are 'legally harvested and traded timber' (see Definitions on page lxviii).

For other materials there are no prerequisite requirements at this stage.

Prerequisite - For Healthcare NHS buildings only:
2 To award any of the available credits for this issue, any party who at any stage manages the construction site (e.g. the principal contractor, the demolition contractor) operates an Environmental Management System (EMS) (see requirements of criterion 3 below).

One credit – Environmental management
3 Any party who at any stage manages the construction site (e.g. the principal contractor, the demolition contractor) operates an EMS covering their main operations.

The EMS must:

3.a: Be third party certified, to ISO 14001:2015(16), EMAS (EU Eco-Management and Audit Scheme) or equivalent standard;

OR

3.b: In compliance with BS 8555: 2016(17) have:

3.b.i Appropriate structure
3.b.ii Reached implementation stage phase four 'implementation and operation of the environmental management system'
3.b.iii Completed defined phase audits one to four.

4 Any party who at any point manages the construction site (e.g. the principal contractor, the demolition contractor) implements best practice pollution prevention policies and procedures on-site in accordance with Working at construction and demolition sites: PPG6, Pollution Prevention Guidelines(18).

One credit – BREEAM AP (site)

Prerequisite for the BREEAM AP credit
5 The client and the contractor formally agree performance targets.
One credit – BREEAM AP (site)

6 Involve a BREEAM AP in the project at an appropriate time and level to:

6.a: Work with the project team, including the client, to consider the links between BREEAM issues and assist them in achieving and if possible going beyond the design intent, to maximise the project’s performance against the agreed performance targets throughout the Construction, Handover and Close Out stages.

6.b: Monitor construction progress against the performance targets agreed under criterion 5 on the previous page throughout all stages where decisions critically impact BREEAM performance.

6.c: Proactively identify risks and opportunities related to the procurement and construction process and the achievement of the targets agreed under criterion 5 on the previous page.

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

6.e: Monitor and, where relevant, coordinate the generation of appropriate evidence by the project team and the provision to the assessor.

Up to two credits - Responsible construction management

Route 1 Using the BREEAM checklist - up to two credits

One credit – Risk evaluation and implementation

7 Appoint a dedicated person to be responsible for monitoring and reporting on activities against risk evaluation documents collected for criteria 6, 8, 11 on the next page and 12 on the next page are sought.

8 The principal contractor evaluates the risks (on-site and off-site), plans and implements actions to minimise the identified risks, covering the following, where appropriate:

8.a: Vehicle movement on and near site:

8.a.i Manage the construction site entrance to minimise the impacts related to the above arising from vehicles approaching and leaving the site.

8.a.ii Ensure the site is accessible for delivery vehicles, including those fitted with safety features (e.g. side under run protection).

8.a.iii Identify access routes to the site, including for heavy vehicles, that minimise traffic disruption and safety risks to others.

8.b: Pollution management:

8.b.i Minimise risks of vibration, air, land, water, light, noise pollution etc. within the assessment zone (see Definitions).

8.b.ii Minimise risks of vibration, air, land, water, light, noise pollution etc. in the affected areas (see Definitions).

8.c: Tidiness:

8.c.i Practices ensure the assessment zone is safe, clean and organised at all times. This includes, but is not limited to facilities, materials and waste storage.

8.c.ii Remove all plant, surplus materials and temporary structures from the construction zone, on completion of the construction works.

8.d: Health and wellbeing:

8.d.i Provide processes and equipment required to respond to medical emergencies.

8.d.ii Establish initiatives by the principal contractor or employer promoting and maintaining the health and wellbeing (e.g. occupational, physical and mental health) of the workforce.
8.d.iii Establish management practices and facilities encouraging equality, diversity, fair treatment and respect of all site operatives, including accessible design, religious practices etc.

8.d.iv Provide secure, clean and organised facilities (e.g. changing and storage facilities) within a location in the construction zone.

8.e: Security processes:

8.e.i Minimise security risks and ensure site security.

8.e.ii Minimise risks and ensure security of the neighbouring community.

**One credit – Training, awareness, monitoring and reporting**

9  Achieve criteria 7 and 8.

10  Achieve criterion 11 OR 12.

11 Training, awareness and feedback. The principal contractor is responsible for ensuring:

11.a The community affected by the site works is identified, notified and kept informed on aspects of the construction process that might influence them, ensuring that nuisance and intrusion are minimised.

11.b Attitudes and conduct of the personnel associated with the site ensure safety and continuous improvements to safety and nuisance.

11.c All operatives and visitors are made aware of health and safety risks and any actions they must take to reduce the risks within the assessment zone.

11.d The principal contractor or employer addresses personal development needs of operatives through training.

11.e All relevant environmental risks and management practices are communicated to the operatives, the site visitors and the neighbouring community.

11.f The fleet operator (where present) undertakes driver training and awareness to promote safety within the construction zone and off-site.

12 Monitoring and reporting. The principal contractor ensures:

12.a The fleet operator (where present) captures, analyses and investigates any road traffic accidents, incidents and near misses and reports them back to the principal contractor. Include all items listed under criterion 8.

12.b All accidents, incidents and near misses are recorded and action is taken to reduce the likelihood of them reoccurring. Include all items listed in criteria 8 and 11.

12.c Processes are in place to facilitate collecting and recording feedback from the community and to address any concerns related to the construction zone and works.

**Route 2: Using a compliant considerate construction scheme - one credit**

13 The principal contractor complies with the criteria of a ‘compliant’ organisational, local or national considerate construction scheme and their performance against the scheme has been confirmed by independent assessment and verification. Refer to the Definitions on page blix section for compliant organisational, local or national considerate construction schemes.

**Up to two credits - Monitoring of construction site impacts**

14 Assign responsibility to an individual for monitoring, recording and reporting 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. To ensure the robust collection of information, this individual must have the appropriate authority and responsibility to request and access the data required. Where appointed, the BREEAM AP could perform this role.
First monitoring credit - Utility consumption

Energy consumption
15 Achieve criterion 14
16 Set targets for the site energy consumption in kWh (and where relevant, litres of fuel used) as a result of the use of construction plant, equipment (mobile and fixed) and site accommodation.
17 Monitor and record data for the energy consumption described in criterion 16.
18 Report the total carbon dioxide emissions (total kgCO₂/project value) from the construction process via BREEAM Projects (for the purposes of potential future BREEAM performance benchmarking).

Water consumption
19 Achieve criterion 14
20 Set targets for the potable water consumption (m³) arising from the use of construction plant, equipment (mobile and fixed) and site accommodation.
21 Monitor and record data for the potable water consumption described in criterion 20.
22 Use the collated data to report the total net water consumption (m³), i.e. consumption minus any recycled water use from the construction process via BREEAM Projects (for the purposes of potential future BREEAM performance benchmarking).

Second monitoring credit - Transport of construction materials and waste
23 Achieve criterion 14
24 Set targets for transport movements and impacts resulting from delivery of the majority of construction materials to site and construction waste from site. As a minimum cover:
24.a. Transport of materials from the point of supply to the building site, including any transport, intermediate storage and point of supply (see Definitions on page lxvii). Monitor as a minimum:
24.a.i. Materials used in major building elements (i.e. those defined in BREEAM issue Mat 01 Environmental impacts from construction products - Building life cycle assessment on page 287).
24.a.ii. Ground works and landscaping materials.
24.b. Transport of construction waste from the construction gate to waste disposal processing or recovery centre gate. This monitoring must cover the construction waste groups outlined in the project's resource management plan.
25 Monitor and record data for the transport movements as described in criterion 24 above.
26 Using the collated data, report separately for materials and waste, the total transport-related carbon dioxide emissions (kgCO₂ eq), plus total distance travelled (km) via BREEAM Projects (for the purposes of potential future BREEAM performance benchmarking).

Exemplary level criteria: one credit
To achieve an exemplary performance credit:
27 Responsible construction management, criteria 7 to 12 are achieved.

Compliance notes
Compliance notes are located in Appendix G – Notes for compliance on page 18 for the consultation. These compliance notes will be available through the knowledge base when the scheme goes live.
Methodology

The role of the BREEAM AP
The AP does not have to be the same person throughout the process. However, they need to keep records of targets, reasons behind decisions, risks etc. and make sure these are handed over if a new AP joins the team.

BREEAM AP monitoring construction progress
To monitor construction progress against the agreed performance targets (see criterion 6.b on page 6). the BREEAM AP should ideally be site based or visit the site regularly to carry out spot checks and may advise actions to be taken to address shortcomings in compliance. The BREEAM AP should monitor site activities with sufficient frequency to identify risks of non-compliance.

In this context, visits should occur at key stages of the construction process, at times where:

- 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 come together and one could harm the integrity or compliance of another system’s performance against BREEAM requirements.

Calculating total transport-related carbon dioxide emissions (kgeq)

Fuel and vehicle-distance conversion factors published by the Department for Environment Food and Rural Affairs (Defra) shall be used to calculate the carbon dioxide emissions from modes of transport for which carbon conversion factors are available. For other modes of transport (freight, rail, sea tanker, cargo ship, planes) refer to the Defra carbon factors for freighting goods. The first of the methodologies below that is practical to implement must be followed for each vehicle type:

1. If data are available on the amount of fuel consumed, then multiply this by the fuel emission factor to calculate the emissions produced.
2. If data are available on the cost of the fuel consumed, then divide this by the price (specific supplier’s price where possible, historic average otherwise) to give the amount of fuel consumed, which can then be used to calculate the emissions produced (via method 1).
3. If data are available on the distance travelled, vehicle loading and fuel efficiency of the vehicle at that loading, then divide the distance by the efficiency to give an estimate of the amount of fuel consumed, which can then be used to calculate the emissions produced (via method 1).
4. If data are available on the distance travelled and fuel efficiency of the vehicle at average loading, then divide the distance by the efficiency to give an estimate of the amount of fuel consumed, which can then be used to calculate the emissions produced (via method 1).
5. If data are available on the distance travelled and vehicle loading, then multiply the distance by the distance emission factor appropriate for the vehicle type and loading to calculate an estimate of the emissions produced.
6. If data are available only on the distance travelled, then multiply the distance by the distance emission factor appropriate for the vehicle type at average loading to calculate an estimate of the emissions produced.

Scope of the responsible construction management issue
This issue includes demolition and construction activities on site, from the beginning of demolition to the completion of the construction. Where the site is taken over by the developer after demolition, the demolition
phase can be excluded from the scope of this part of the issue.

Training

See criterion 11.

For the purposes of this BREEAM issue, training can be teaching, or developing in oneself or others, any skills and knowledge that relate to specific useful competencies.

Training includes, but is not limited to the following:

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

Responsible construction management: Frequency of monitoring

See criteria 11 and 12

Site monitoring and visits shall occur at stages where:

- significant health and safety risks or errors are likely to occur
- timing is critical for demonstrating compliance with the criteria of this issue
- 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.

Dedicated persons

This can be a member of the project team or not. The person should ideally be based on site or frequently be on site.

This does not have to be the same person throughout the process. However, they need to keep any records required for BREEAM evidence purposes and make sure these are handed over if a new person takes over.

There can be one or more dedicated persons on site at the same time responsible for different items within criteria 11 and 12.

Evidence

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Interim design stage</th>
<th>Final post-construction stage</th>
</tr>
</thead>
<tbody>
<tr>
<td>All</td>
<td>One or more of the appropriate evidence types listed in <em>The BREEAM evidential requirements on page 38</em> can be used to demonstrate compliance with these criteria.</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Refer to generic evidence requirement above</td>
<td>Where certified materials were used, copies of all relevant certificates or chain of custody evidence.</td>
</tr>
<tr>
<td>3</td>
<td>Refer to generic evidence requirement above</td>
<td>A copy of the principal contractors EMS/EMAS certificate or for BS 8555, evidence of their status, e.g. a copy of their phase 4 audit.</td>
</tr>
<tr>
<td>13</td>
<td>Refer to generic evidence requirement above</td>
<td>Scheme certificate and compliance report.</td>
</tr>
<tr>
<td>5–14</td>
<td>See E29 in <em>The BREEAM evidential requirements</em> Table 8 on page 40</td>
<td>As per interim design stage.</td>
</tr>
</tbody>
</table>
Definitions

Affected areas
The areas over which ecological features, animals and humans may be affected by vibration, air, land, water, light, noise pollution etc. caused by activities within the assessment zone.

Assessment zone
For the purpose of this BREEAM issue the assessment zone is defined as any land on the site which is being developed (and therefore disturbed) for buildings, hardstanding, soft landscaping, site access, plus a 3m wide zone measured outward from the boundary around these areas irrespective of site boundary. It also includes any areas used for temporary site storage and buildings.
If it is not known exactly where buildings, hardstanding, site access and temporary storage will be located, it must be assumed that the assessment zone is the entire site.

Compliant organisational, local or national considerate construction schemes
The Considerate Constructors Scheme (CCS) is defined as a compliant scheme for the purpose of this BREEAM issue: To achieve BREEAM credits using the CCS and its Code of Considerate Practice, the principal contractor must achieve scheme certification and a CCS score of 40 or more (a score of at least 8 in each of the five sections must be achieved). A site can be visited by a CCS Monitor more than once and the CCS Certificate will be awarded based on the results of the CCS Monitor’s final visit. At the final stage of the BREEAM assessment, the number of BREEAM credits awarded shall therefore be based on the final visit and the subsequent Monitor’s report and certified CCS score.
Where a considerate construction or constructor’s scheme exists and is not listed as a compliant scheme, the scheme administrator or operator shall apply to BRE Global for details on how to achieve recognition as a compliant scheme.

Considerate Constructors Scheme (CCS)
The 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.

Construction process
The construction process includes the enabling works, assembly, installation and dis-assembly 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 the development project.

Formally agree
The term ‘formally agreed’ relates to performance targets. Examples of formal agreements include a contract or letters of appointment with the architect and with other relevant project team members.
Legally harvested and traded timber

BREEAM follows the UK government’s definition of legally sourced timber, as outlined in the Central Point of Timber (CPET) 5th Edition on 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. Independently verifiable legal and sustainable sources (FSC or PEFC)
2. Forest Law Enforcement, Governance and Trade (FLEGT)—licensed timber or equivalent sources
3. Evidence on a case-by-case basis in line with the Framework for Evaluating Category B evidence

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 the CPET website www.gov.uk/guidance/.

Reused timber formwork automatically complies. Reusable timber formwork itself does not automatically comply. All timber used in the manufacturing of the formwork must be covered by a responsible sourcing certification scheme (RSCS) recognised by BREEAM. See Guidance Note 18 for the BREEAM recognised RSCS schemes.

Performance targets

Performance targets refer to the BREEAM rating and minimum standards required. Where appropriate, performance targets can be related to individual BREEAM credits. However, performance targets may also involve other targets related to issues covered in BREEAM assessments, e.g. energy, health and wellbeing.

Point of supply

For the purposes of this issue, point of supply is the point where the product is supplied from 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 gate (i.e. where manufacture and pre-assembly finishes and the material is in its final product form). Examples might include:

1. steel, concrete or glass manufacturers for cladding, windows and beams etc.
2. quarry gate for aggregate and sand
3. concrete plant for concrete
4. saw mill and timber processing plant for timber.

Project team

The composition of the project team may change through the duration of a project and may include several members. This includes but is not limited to the client, the design teams, contractors etc.

Additional information

CO₂ reporting protocols

At time of publication, the following guidance is available for CO₂ measuring protocols.

1. Encord: www.encord.org. They have launched a CO₂ reporting protocol.

**Tools for monitoring and targeting construction site impacts**

BRE's online environmental reporting tool, SMARTWaste, enables users to capture, monitor and target a project's on-site energy consumption and produce a CO₂ footprint, water consumption and responsible sourcing of timber. Transport and CCS data can also be collected. The system can be used as a tool to help meet the criteria of this issue and as a source of evidence for demonstrating compliance. It is available through the SMARTWaste membership scheme by developing tailor-made versions of SMARTWaste. More details on the tool and membership are available at [www.smartwaste.co.uk](http://www.smartwaste.co.uk).

**Constructing Excellence and reporting of construction site impacts**

Constructing Excellence publishes the construction industry key performance indicators (KPIs) based on data collected by the Department for Business, Innovation and Skills via a voluntary quarterly survey returned by contractors throughout the UK. The Office of National Statistics also reports the annual results in the Construction Statistics Annual. One of the key performance indicators is the amount of CO₂ emissions caused by the energy used during the construction process per £100,000 of project value (kgCO₂/£100k).

Information collated by contractors as part of their voluntary submissions to Constructing Excellence may also serve to help demonstrate compliance with this BREEAM issue.

**BREEAM Advisory Professional and existing Accredited Professionals and Site Sustainability Managers**

All current BREEAM Accredited Professionals will automatically be qualified as BREEAM Advisory Professionals and will be able to carry out their work under the title of 'BREEAM Advisory Professional Design and Site' under the new scheme. Existing Site Sustainability Managers, likewise, will automatically be qualified as BREEAM Advisory Professionals and will be able to continue to carry out their work under the title of 'BREEAM AP Site'.

**The value of the BREEAM AP**

The BREEAM AP can be called on and provide 'scheme related' expertise 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.

An AP can work for a construction organisation frequently undertaking BREEAM related work. Moreover, the BREEAM AP can be the same person as the BREEAM Assessor. This allows flexibility and versatility of their role.

Cost efficiencies are expected where the appointed licensed assessor also acts as the BREEAM AP for a project.

In either case, an efficient AP will coordinate 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**

There are several tools and schemes which can contribute to achieving this credit, although none of them addresses all of the criteria on its own. Examples include but are not limited to the following: Fleet Operator Recognition Scheme (FORS), Construction Logistics and Cyclist Safety (CLOCS) and Yellow Jacket.
Man 04 Commissioning and handover

Aim

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

- Improve actual building performance by ensuring systems are adequately commissioned prior to and following handover.
- Reduce the gap between predicted design performance and as-built actual performance.
- Improve occupant comfort conditions and meet end user requirements, therefore boosting satisfaction and productivity.
- Reduce operation and maintenance costs through robust and efficient maintenance schedules, increased systems’ lifetime and well trained operational and maintenance staff.
- Allow facilities managers and building owners to better understand the functionality of the building and how to ensure it continues to perform at optimum levels.

Context

The performance of building services has a significant environmental, financial and health impact for buildings occupants and owners. Operational energy consumption, and the associated CO₂ emissions, can be up to five times higher than design stage predictions\(^{(21)}\) and much of this can be attributed to deficient management practices and a lack of understanding of the design intentions. Badly installed and inadequately commissioned ductwork is one of the biggest causes of poorly performing ventilation systems (www.cambridge-k1.co.uk), leading to reductions in indoor air quality.

From a financial perspective, UK research (www.usablebuildings.co.uk) suggests that 90% of heating and ventilating systems in buildings are ‘out of control’, costing industry and commerce an additional £500m per annum in energy costs.

Assessment scope

<table>
<thead>
<tr>
<th>Applicable assessment criteria</th>
<th>Fully fitted</th>
<th>Simple building</th>
<th>Shell and core</th>
<th>Shell only</th>
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<tr>
<td>Assessment type specific notes</td>
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<td>None</td>
<td>see ref. 1.0 and 1.1</td>
<td>see ref. 1.1</td>
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<table>
<thead>
<tr>
<th>Assessment type specific</th>
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</thead>
<tbody>
<tr>
<td>1.0</td>
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<tr>
<td>1.1</td>
</tr>
</tbody>
</table>
over to the fit-out contractor, who can then complete the relevant sections based on the fit-out strategy.

**Building type specific**

None
Man 04 Commissioning and handover

Assessment criteria

This issue is split into four parts:

– Commissioning - testing schedule and responsibilities (one credit)
– Commissioning - design and preparation (one credit)
– Testing and inspecting building fabric (one credit)
– Handover (one credit).

One credit - Commissioning - testing 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 identifies the appropriate standards for all commissioning activities to be conducted, where applicable, in accordance with:

   2.a: Current Building Regulations
   2.b: BSRIA guidelines (22)
   2.c: CIBSE guidelines (23)
   2.d: Other appropriate standards (see Methodology on the facing page)

Exclude from the assessment any process or manufacture-related equipment specified as part of the project. However, include such equipment in cases where they form an integral part of the building HVAC services, such as some heat recovery systems.

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. Allow the required time to complete all commissioning and testing activities prior to handover.
One credit - Commissioning - design and preparation

6 Achieve criteria 1 to 5.

7 During the design stage, the client or the principal contractor appoints an appropriate project team member (see criterion 4), provided they are not involved in the general installation works for the building services systems, with responsibility for:

7.a: Undertaking design reviews and giving advice on suitability for ease of commissioning.

7.b: Providing commissioning management input to construction programming and during installation stages.

7.c: Management of commissioning, performance testing and handover or post-handover stages.

For buildings with complex building services and systems, this role needs to be carried out by a specialist commissioning manager.

One credit - Testing and inspecting building fabric

8 Achieve 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 is through air tightness testing and a thermographic survey). A suitably qualified professional (see Definitions on page lxxviii) undertakes the survey and testing in accordance with the appropriate standard.

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

One credit - Handover

11 Prior to handover, develop two building user guides (see Methodology) 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 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.

Compliance notes

Compliance notes are located in Appendix G – Notes for compliance on page 18 for the consultation. These compliance notes will be available through the knowledge base when the scheme goes live.

Methodology

Building user guide

The building user guides shall be building 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, but broadly should include information on the following:

- Overview of the building and its environmental strategy, e.g. energy, water or waste efficiency policy or strategy and how users should engage with and deliver the policy or strategy.
- Provision of, and access to, shared facilities.
- Safety and emergency information or instructions.
- Building-related operational procedures specific to building type or operation, e.g. laboratories.
- Building-related incident reporting and feedback arrangements.
- Provision of and access to transport facilities, e.g. public transport, cyclist facilities, pedestrian routes etc.
- Provision of and access to local amenities.
- Links, references and relevant contact details.

Additionally, for the building occupiers’ guide:

- Building services overview and access to building occupant controls, e.g. where to find them, what they control, how to operate effectively and efficiently etc.
- Pre-arrival information for visitors, e.g. access and security procedures or provisions

Additionally, for the facilities managers’ guide:

- 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.
- Re-fit, refurbishment and maintenance arrangements or considerations
- Building related training information or links

The building user guide for building occupiers shall be written in plain English 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.

Commissioning - testing schedule and responsibilities: other appropriate standards

Appropriate standards for completion of criterion 2.d on page bovi include the following:

Building fabric


Commercial refrigeration

2. GPG 347 Installation and Commissioning of refrigeration systems (27)

Fume cupboards

1. Labs2 1 programme: A design Guide for energy Efficient Research Laboratories: Commissioning section (28) - (Applicable to Education building types only)
2. BS 7989:2001 Specification for recirculatory filtration fume cupboards (29)
3. BS EN 14175-4:2004 Fume cupboards: On-site test methods (30)
Microbiological safety cabinets

1. Labs21 programme: A design Guide for energy Efficient Research Laboratories: Commissioning section— (Applicable to Education building types only)

Thermographic survey

Scope
The thermographic survey must cover 100% of the treated spaces, unless it is a large complex building (see below). Ensure that all elements of the building fabric that enclose an internal heated or conditioned (treated) zone of the building are tested. This includes internal walls separating treated and untreated zones.

Large complex buildings
In the case of large complex buildings, it may be impractical for the thermographic survey and air tightness testing to cover 100% of the building. Where a complete thermographic survey is deemed impractical by a Level 2 qualified thermographic surveyor, the guidance in air tightness standard TSL2(32) should be followed on the extent of the survey and testing. This could include airports, large hospitals and high-rise buildings.

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

Training schedule
The training schedules shall include the following as a minimum:

– The building’s design intent.

Additionally, for the building occupiers’ training schedule:

– Introduction to the 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 facilities managers’ user guide and other relevant building documentation, e.g. design data, technical guides, maintenance strategy, operations and maintenance (O&M) manual, commissioning records, log book etc.
– Maintenance requirements, including any maintenance contracts and regimes in place.

Evidence

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Interim design stage</th>
<th>Final post-construction stage</th>
</tr>
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<tbody>
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<td>All</td>
<td>One or more of the appropriate evidence types listed in The BREEAM evidential</td>
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<td>Criteria</td>
<td>Interim design stage</td>
<td>Final post-construction stage</td>
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<tr>
<td>requirements on page 38 can be used to demonstrate compliance with these criteria.</td>
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<td></td>
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<tr>
<td>9 and 10</td>
<td>Refer to generic evidence requirement above</td>
<td>Thermographic survey and Level 2 thermography certificate</td>
</tr>
<tr>
<td>11 and 12</td>
<td>Refer to generic evidence requirement above</td>
<td>Building user guide</td>
</tr>
</tbody>
</table>

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, microbiological safety cabinets and fume cupboards, cold storage enclosures and refrigeration plant.

Specialist commissioning managers
The specialist commissioning manager is a specialist contractor rather than a general sub-contractor, who in the opinion of the assessor has experience or qualifications that enable them to undertake the responsibilities described in this issue.

Suitably Qualified Professionals - thermographic survey and airtightness testing
Thermography surveys and airtightness testing are to be undertaken by suitably qualified professionals in accordance with the appropriate standards, as follows:
Airtightness testing: by professionals with membership of Air Tightness Testing and Measurement Association (ATTMA) or Independent Air Tightness Testing Scheme (IATS) attained at organisational level maintaining UKAS (United Kingdom Accreditation Service) accreditation (as air tightness testing laboratories to ISO 17025). Thermographic survey: by professionals holding a valid Category 2, e.g. PCN (Personnel Certification in Non-Destructive Testing) or QCF (Ofqual’s Qualification and Credit Framework) or RQF (Regulated Qualifications Framework) Level 4, e.g. ABBE (Awarding Body for the Built Environment), certificate in thermography (as defined by the UKTA (UK Thermography Authority) website). Where a Category 2 or Level 4 thermographer is not available, the survey may be undertaken by a Category 1 thermographer and then the images interpreted by a Category 2 or Level 4 thermographer.

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 Reduction of energy use and carbon emissions on page clix**, 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.

**Additional information**

**Useful guidance**

Man 05 Aftercare

Aim

To ensure the building operates in accordance with the design intent and operational demands, through providing aftercare to the building owner and occupants during the first year of occupation.

Value

- Improve building performance by continuing to monitor and commission the building in early stages of occupation.
- Reduce the gap between predicted design and as-built actual energy and environmental performance.
- Improve occupant comfort and indoor environmental conditions to meet end user requirements and maximise occupant health and wellbeing.
- Increase occupant satisfaction.
- Improve learning from actual building performance to inform future procurement, design, construction and management practices as well as enhance asset value and satisfaction.

Context

Buildings seldom perform in operation as they were predicted to do during design. This is caused by a variety of factors, but deficiencies in operational management and a lack of user understanding play a significant part in this.
A lack of communication between building designers, installers and those who will operate them is a major factor. Improved ongoing commissioning practices can help considerably in allowing for the transfer of knowledge and understanding as well as ironing out teething problems in the building and its systems as occupants begin to settle in.

Post Occupancy Evaluation (POE) is increasingly recognised as a valuable means of gaining understanding on how a building is working for those that live and work in it. POE is becoming mandatory on many public sector projects but is valuable in all sectors as poor building performance can impact on running costs, occupant wellbeing and business efficiency. A POE can help to identify teething problems, gaps in building operation understanding and can help share lessons for the benefit of future new build or refurbishment projects, improving our understanding of how buildings are actually used and operated in practice.

### Assessment scope

<table>
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<tr>
<th>Assessment criteria applicable</th>
<th>Fully fitted</th>
<th>Simple building</th>
<th>Shell and core</th>
<th>Shell only</th>
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<tbody>
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<td>All</td>
<td>All</td>
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<td>Not applicable</td>
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</tbody>
</table>

| Assessment type specific notes | None          | None            | None           | None          |

| Assessment type specific       | None          |
| Building type specific         | None          |
Man 05 Aftercare

Assessment criteria

This issue is split into three parts:

– Aftercare support (one credit)
– Commissioning - implementation (one credit)
– Post Occupancy Evaluation (POE) (one credit).

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 building user guide (where existing) and training schedule and their content.

1.a.ii Present key information on 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 building occupation, 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 building is substantially occupied. This facilitates analysis of discrepancies between actual and predicted performance, with a view to adjusting systems and user behaviours accordingly.

One credit - Commissioning - implementation

3 Complete the following commissioning activities over a minimum 12-month period, once the building 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 any impaired performance.
3.a.ii Test all building services under full load conditions, i.e. heating equipment in mid-winter, cooling and ventilation equipment in mid-summer and under part load conditions (spring and autumn).

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 Produce monthly reports comparing sub-metered energy performance to the predicted one (see Ene 01 Reduction of energy use and carbon emissions on page clix).

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 (naturally ventilated): 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 (POE)

4 The client or building occupier commits to carry out a POE exercise (see Definitions on page boox) one year after the building is substantially occupied. This gains comprehensive in-use performance feedback (see criterion 5.b.v below) 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 (see Definitions on page boox) 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 Methodology)

5.b.vi Other relevant issues, where appropriate (see Definitions on page boox)

6 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. Evidence of the appointment of the independent party and schedule of responsibilities which fulfils the BREEAM criteria are acceptable to demonstrate compliance.

Compliance notes

Compliance notes are located in Appendix G – Notes for compliance on page 18 for the consultation. These compliance notes will be available through the knowledge base when the scheme goes live.
Methodology

Data collection and provision

Collection and monitoring of energy and water consumption data
This function (see criteria 2 and 5.b. on the previous page) can be coordinated or carried out by:

a dedicated aftercare team

OR

by the building owner or occupier’s estates or facilities management team, where the building occupier is known and able to confirm compliance based on their existing or proposed operations for the building.

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 the relevant part of the BREEAM In-Use scheme.

Evidence

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Interim design stage</th>
<th>Final post-construction stage</th>
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</thead>
<tbody>
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<td>All</td>
<td>One or more of the appropriate evidence types listed in the BREEAM evidential requirements on page 38 can be used to demonstrate compliance with these criteria.</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Refer to generic evidence requirement above</td>
<td>Contract to provide compliant aftercare support and training</td>
</tr>
<tr>
<td>2</td>
<td>Refer to generic evidence requirement above</td>
<td>Commissioning records, reports and letter of appointment</td>
</tr>
<tr>
<td>4</td>
<td>Refer to generic evidence requirement above</td>
<td>Where the criteria require the commissioning activities to be completed over a minimum 12-month period following (substantial) building occupation, it is accepted that completed records may not be available at the time of final certification. In such cases, evidence of the appointment of a commissioning manager and schedule of commissioning responsibilities which fulfils the BREEAM criteria are acceptable to demonstrate compliance.</td>
</tr>
</tbody>
</table>
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, microbiological safety cabinets and fume cupboards, cold storage enclosures and refrigeration plant.

Independent party
A third-party, a person or body internal to a party involved (parties involved are typically a supplier (1st party) or purchaser (2nd party)), who shall not be involved in the issue in question, and shall not have conflicts of interests resulting from their position. To comply with the criterion relating to the use of an independent party, the client or design team needs to demonstrate either:

1. They have used a party independent of the design process to conduct the necessary consultation exercise; 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.

Other relevant issues
Other relevant issues include the following:
- Health, safety and well-being
- 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).

POE
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 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:
- BCO guide to Post Occupancy Evaluation, British Council for Offices (BCO), 2007(33)
- BRE’s Design Quality Method (DQM) is a tried and tested, independent, post occupancy evaluation (POE) method used by all UK auditing authorities, and many funding bodies. Further information can be found at www.bre.co.uk
- BRE Digest 478, Building performance feedback: getting started(34)
- The Building Use Studies (BUS) methodology is an occupant satisfaction survey that will fulfil part of the POE credit requirement, occupant feedback stage: www.busmethodology.org.uk/
- The Design Quality Indicator (DQI) is a method to assess the design quality of buildings. DQIs a process that actively involves a wide group of stakeholders in the design of building. It is delivered through a facilitated workshop that enables representatives from both the demand and supply side to work together to achieve the best outcome. Completion of the DQI Stage 5, in-use stage workshop could fulfil part of the POE credit requirement, the occupant feedback stage. See www.dqi.org.uk
- BSRIA Guide to Building Performance Evaluation in Non-Domestic Buildings (36) is a general introduction to BPE, and explains why it is important and how it can be carried out.

Specialist commissioning managers

The specialist commissioning manager is a specialist contractor rather than a general sub-contractor, who in the opinion of the assessor has experience or qualifications that enable them to undertake the responsibilities described in this issue.

Substantially occupied

For the purposes of this BREEAM Issue, a building is considered as substantially occupied when 80% of each building function area is occupied.

Third party

A person or body that is recognised as being independent of the parties involved (parties involved are typically a supplier (1st party) or purchaser (2nd party)), as concerns the issue in question.

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. Sources of benchmarking information can be found in the following documents here: Building performance benchmarks can be found in CIBSE Guidance including:
- CIBSE TM46: Energy Benchmarking(38)
- CIBSE TM47: Operational Ratings and Display Energy Certificate(39)

Actual building performance data can also be found here:
- CarbonBuzz: www.carbonbuzz.org
- Technology Strategy Board Building Performance Evaluation: connect.innovateuk.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 predicted vs actual models. Figures reported via the Carbon Buzz website show that on average, buildings consume between 1.5 and 2.5 times the predicted values. When comparing predicted with
actual, an analysis should be carried out to understand why there may be discrepancies in performance. These discrepancies can be due to reasons including:

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

CIBSE TM54(40) provides guidance on how to improve the accuracy of the model for operational energy use of buildings at the design stage. The Carbon Trust guidance, ‘Closing the gap: Lessons learned on realising the potential of low carbon building design’(41), also provides additional guidance on this issue.
Health and Wellbeing

![Image showing distribution of Fully fitted, Simple building, Shell & core, Shell only categories with percentages: 14%, 13%, 7%, 5%]

Summary
This category encourages the increased health, wellbeing and safety of building users. Issues within this category reward building design and specification decisions that create a healthy, safe and comfortable internal and external environment.

Hea 01 Visual comfort
- Providing occupants with the conditions that facilitate good visual comfort by designing out the potential for glare, achieving good practice daylight factors and having an adequate view out.
- Internal and external lighting systems are designed to provide appropriate illuminance (lux) levels to provide a more comfortable environment for occupants and internal lighting is zoned to allow for occupant control.

Hea 02 Indoor air quality
- Indoor air pollution is considered, and a mitigation strategy in place, early in the design process so as to facilitate good indoor air quality.
- Harmful emissions from building products are managed by specifying finishes and products that have been tested in accordance with the appropriate standards.
- Specification of an appropriate ventilation strategy that maintains good indoor air quality in-use.

Hea 03 Safe containment in laboratories
- Health and safety risks in laboratories are assessed and managed through best practice safety and performance requirements.
- Mitigating health & nuisance effects of the dispersion and dilution of fumes from laboratories.

Hea 04 Thermal comfort
- Thermal modelling informs the building design to provide a comfortable thermal environment that considers current climatic conditions, and projected climate change scenario conditions.
- Occupants have control over their environment through appropriate temperature control strategies and thermal zoning.

Hea 05 Acoustic performance
- Occupants experience best practice acoustic performance levels appropriate to the functional activities in occupied spaces.

Hea 06 Security
- The building is designed to consider and take into account security needs to ensure occupants safety and wellbeing.

Hea 07 Safe and healthy surroundings
- External site areas are provided for safe occupant use
- The wellbeing of building users is enhanced with access to an outdoor space.
Hea 01 Visual comfort

Aim

To encourage best practice in visual performance and comfort by ensuring daylighting, artificial lighting and occupant controls are considered.

Value

Supports building occupier health, mental wellbeing and productivity
- Helps to provide a connection to nature by maximising natural daylight and encouraging an external view out
- Helps to reduce energy costs and environmental impact by reducing the need for artificial light

Context

Visual comfort is an important part of ensuring building occupant health, comfort and wellbeing. Reducing glare that can cause discomfort and distraction, and enabling occupant lighting control, the building can increase productivity of its users. By reducing the impacts of glare that can cause discomfort and distraction, and enabling
occupants to have a level of control over their visual environment, the building can increase productivity of its users. Maximising exposure to natural daylight and providing an external view out provides users with a connection to nature. This can in turn support mental wellbeing, for example by improving people's mood and reducing the symptoms of depression. Increasing the level of daylight within the building also reduces the need for artificial lighting, which can reduce operational costs and environmental impacts of the building. Further to this, naturally lit environments increase occupant productivity, and support the regulation of circadian rhythms.

**Assessment scope**

<table>
<thead>
<tr>
<th></th>
<th>Fully fitted</th>
<th>Simple building</th>
<th>Shell and core</th>
<th>Shell only</th>
</tr>
</thead>
<tbody>
<tr>
<td>Applicable assessment criteria</td>
<td>All</td>
<td>All</td>
<td>4, 5–7, 10–11, and 15</td>
<td>4, 5–7, 10–11, and 15</td>
</tr>
<tr>
<td>Assessment type specific notes</td>
<td>None</td>
<td>None</td>
<td>See ref 1.0</td>
<td>See ref 1.0</td>
</tr>
</tbody>
</table>

**Assessment type specific**

1.0 **View Out**

If it is not possible to confirm which areas of the building will contain workstations, benches or desks, all areas of the building designed for or likely to be occupied by workstations, benches or desks must comply with the relevant criteria.

**Building type specific**

2.0 **Prison buildings**

The criteria for zoning of lighting control are excluded for assessments of prison buildings.
Hea 01 Visual comfort

Assessment criteria

This issue is split into four parts:

- Control of glare from sunlight control (one credit)
- Daylighting (up to two credits - building type dependent)
- View out (one credit all buildings, two credits healthcare buildings with inpatient areas.)
- Internal and external lighting (one credit)

One credit - Control of glare from sunlight

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. A glare control strategy designs out potential glare in all relevant building areas where risk has been identified. This should be achieved through building form and layout or building design measures.

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 two credits - Daylighting (building type dependent)

4. Daylighting criteria have been met using either of the following options:
   4.a: The relevant building areas meet good practice daylight factors and other criterion as outlined in Table 10 and Table 11 on the next page OR
   4.b: The relevant building areas meet good practice average and minimum point daylight illuminance criteria as outlined in Table 12 on page xciii.

Additional alternative route for healthcare building types only:

4.c: The relevant building areas meet the median daylight factors and minimum daylight factors in Table 13 on page xcv (see Methodology on page xcvii).

Table 10 Minimum values of average daylight factor required

<table>
<thead>
<tr>
<th>Building or area type</th>
<th>Credits</th>
<th>Average daylight factor required</th>
<th>Minimum area (m²) to comply</th>
<th>Other requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Education buildings</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Preschools, schools, further education-occupied spaces</td>
<td>2</td>
<td>2%</td>
<td>80%</td>
<td>EITHER (a) OR ((b) and (c)) in Table 11</td>
</tr>
<tr>
<td>Higher education-occupied spaces</td>
<td>1</td>
<td>2%</td>
<td>60%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>2%</td>
<td>80%</td>
<td></td>
</tr>
<tr>
<td>Healthcare buildings</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Building or area type</td>
<td>Credits</td>
<td>Average daylight factor required</td>
<td>Minimum area (m²) to comply</td>
<td>Other requirements</td>
</tr>
<tr>
<td>-----------------------------------------------------------</td>
<td>---------</td>
<td>---------------------------------</td>
<td>----------------------------</td>
<td>-----------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Staff and public areas</td>
<td>1</td>
<td>2%</td>
<td>80%</td>
<td>EITHER (a) OR (b) and (c) in Table 11</td>
</tr>
<tr>
<td>Occupied patient’s areas (dayrooms, wards) and consulting rooms</td>
<td>2</td>
<td>2%</td>
<td>80%</td>
<td></td>
</tr>
<tr>
<td>Staff &amp; public areas</td>
<td>2</td>
<td>2%</td>
<td>80%</td>
<td>EITHER (a) OR (b) and (c) in Table 11</td>
</tr>
<tr>
<td>Occupied patient’s areas (dayrooms, wards) and consulting rooms</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Multi-residential buildings</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kitchen</td>
<td>2</td>
<td>2%</td>
<td>80%</td>
<td>EITHER (a) OR (c) in Table 11</td>
</tr>
<tr>
<td>Living rooms, dining rooms, studies (including home office)</td>
<td></td>
<td>2%</td>
<td>80%</td>
<td></td>
</tr>
<tr>
<td>Non-residential or communal occupied spaces</td>
<td></td>
<td>2%</td>
<td>80%</td>
<td></td>
</tr>
<tr>
<td>Retail buildings</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sales areas</td>
<td>1</td>
<td>-</td>
<td>35%</td>
<td>Point daylight factors of 2% or more</td>
</tr>
<tr>
<td>Other occupied areas</td>
<td>1</td>
<td>2%</td>
<td>80%</td>
<td>EITHER (a) OR (b) and (c) in Table 11</td>
</tr>
<tr>
<td>Prison buildings</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cells and custody cells</td>
<td>2</td>
<td>1.5%</td>
<td>80%</td>
<td>N/A</td>
</tr>
<tr>
<td>Internal association or atrium area</td>
<td></td>
<td>3%</td>
<td>80%</td>
<td>EITHER a uniformity ratio of at least 0.7 OR a minimum point daylight factor of 2.1%</td>
</tr>
<tr>
<td>Patient care spaces</td>
<td></td>
<td>3%</td>
<td>80%</td>
<td>EITHER (a) OR (b) and (c) in Table 11</td>
</tr>
<tr>
<td>Teaching, lecture and seminar spaces</td>
<td></td>
<td>2%</td>
<td>80%</td>
<td>EITHER (a) OR (b) and (c) in Table 11</td>
</tr>
<tr>
<td>Office buildings</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>All occupied spaces, unless indicated in Daylighting relevant building areas on page ci</td>
<td>2</td>
<td>2%</td>
<td>80%</td>
<td>EITHER (a) or (b) and (c) in Table 11</td>
</tr>
<tr>
<td>Crèche buildings</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>All occupied spaces, unless indicated in Daylighting relevant building areas on page ci</td>
<td>2</td>
<td>2%</td>
<td>80%</td>
<td>EITHER (a) or (b) and (c) in Table 11</td>
</tr>
<tr>
<td>Courts, Industrial and Other building types</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>All occupied spaces, unless indicated in Daylighting relevant building areas on page ci</td>
<td>1</td>
<td>2%</td>
<td>80%</td>
<td>EITHER (a) or (b) and (c) in Table 11</td>
</tr>
</tbody>
</table>

**Table 11 Daylighting uniformity criteria**

<table>
<thead>
<tr>
<th>Ref</th>
<th>Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a)</td>
<td>A uniformity ratio of at least 0.3. Or, a minimum point daylight factor of at least 0.3 times the relevant average daylight factor value in Table 10 on the previous page. Spaces with glazed roofs, such as atria, must achieve a uniformity ratio of at least 0.7. Or, a minimum point daylight factor of at least 0.7 times the relevant average daylight factor value in Table 10.</td>
</tr>
<tr>
<td>(b)</td>
<td>At least 80% of the room has a view of sky from desk or table top height (0.85m in multi-residential)</td>
</tr>
</tbody>
</table>
(c) The room depth criterion \( d/w + d/\text{HW} < 2/(1-RB) \) is satisfied. Where: 
\[
\begin{align*}
d &= \text{room depth}, \\
w &= \text{room width}, \\
\text{HW} &= \text{window head height from floor level}, \\
RB &= \text{average reflectance of surfaces in the rear half of the room},
\end{align*}
\]
Table 18 on page xcix gives maximum room depths in metres for different room widths and window head heights of side-lit rooms.

Table 12 Space type and illuminance requirements - both criteria (average illuminance and minimum point illuminance) should be met.

<table>
<thead>
<tr>
<th>Area type</th>
<th>Credits</th>
<th>Minimum area to comply</th>
<th>Average daylight illuminance (averaged over entire space)</th>
<th>Minimum daylight illuminance at worst lit point</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Education buildings</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Preschools, schools, further education - occupied spaces</td>
<td>2</td>
<td>80%</td>
<td>At least 300 lux for 2000 hours per year or more</td>
<td>At least 90 lux for 2000 hours per year or more</td>
</tr>
<tr>
<td>Higher education - occupied spaces</td>
<td>1</td>
<td>60%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>OR Higher education - occupied spaces</td>
<td>2</td>
<td>80%</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Healthcare buildings</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Staff and public areas</td>
<td>1</td>
<td>80%</td>
<td>At least 300 lux for 2000 hours per year or more</td>
<td>At least 90 lux for 2000 hours per year or more</td>
</tr>
<tr>
<td>Occupied patients areas (dayrooms, wards) and consulting rooms</td>
<td>80%</td>
<td></td>
<td>At least 300 lux for 2000 hours per year or more</td>
<td>At least 90 lux for 2000 hours per year or more</td>
</tr>
<tr>
<td>Staff and public areas</td>
<td>2</td>
<td>80%</td>
<td>At least 300 lux for 2650 hours per year or more</td>
<td>At least 90 lux for 2650 hours per year or more</td>
</tr>
<tr>
<td>Occupied patients areas (dayrooms, wards) and consulting rooms</td>
<td>80%</td>
<td></td>
<td>At least 300 lux for 2650 hours per year or more</td>
<td>At least 90 lux for 2650 hours per year or more</td>
</tr>
<tr>
<td><strong>Multi-residential buildings</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kitchen</td>
<td>2</td>
<td>100%</td>
<td>At least 100 lux for 3450 hours per year or more</td>
<td>At least 30 lux for 3450 hours per year or more</td>
</tr>
<tr>
<td>Living rooms, dining rooms, studies (including home office)</td>
<td></td>
<td></td>
<td>At least 100 lux for 3450 hours per year or more</td>
<td>At least 30 lux for 3450 hours per year or more</td>
</tr>
<tr>
<td>Non-residential or communal occupied spaces</td>
<td>80%</td>
<td></td>
<td>At least 200 lux for 2650 hours per year or more</td>
<td>At least 60 lux for 2650 hours per year or more</td>
</tr>
<tr>
<td><strong>Retail buildings</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sales areas</td>
<td>1</td>
<td>35%</td>
<td>At least 200 lux point daylight illuminances for 2650 hours per year or more</td>
<td></td>
</tr>
<tr>
<td>Other occupied areas</td>
<td>1</td>
<td>80%</td>
<td>At least 200 lux for 2650 hours per year or more</td>
<td>At least 60 lux for 2650 hours per year or more</td>
</tr>
<tr>
<td><strong>Prison buildings</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Area type</td>
<td>Credits</td>
<td>Minimum area to comply</td>
<td>Average daylight illuminance (averaged over entire space)</td>
<td>Minimum daylight illuminance at worst lit point</td>
</tr>
<tr>
<td>-----------------------------------------------</td>
<td>---------</td>
<td>------------------------</td>
<td>-----------------------------------------------------------</td>
<td>------------------------------------------------</td>
</tr>
<tr>
<td>Cells and custody cells</td>
<td>2</td>
<td>80%</td>
<td>At least 100 lux for 3150 hours per year or more</td>
<td>N/A</td>
</tr>
<tr>
<td>Internal association or atrium</td>
<td></td>
<td>80%</td>
<td>At least 300 lux for 2650 hours per year or more</td>
<td>At least 210 lux for 2650 hours per year</td>
</tr>
<tr>
<td>Patient care spaces</td>
<td></td>
<td>80%</td>
<td>At least 300 lux for 2650 hours per year or more</td>
<td>At least 210 lux for 2650 hours per year</td>
</tr>
<tr>
<td>Teaching, lecture and seminar spaces</td>
<td></td>
<td>80%</td>
<td>At least 300 lux for 2000 hours per year or more</td>
<td>At least 90 lux for 2000 hours per year or more</td>
</tr>
</tbody>
</table>

**Office buildings**

All occupied spaces, unless indicated in [Daylighting relevant building areas on page ci](#)

<table>
<thead>
<tr>
<th>Credits</th>
<th>Minimum area to comply</th>
<th>Average daylight illuminance (averaged over entire space)</th>
<th>Minimum daylight illuminance at worst lit point</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>80%</td>
<td>At least 300 lux for 2000 hours per year or more</td>
<td>At least 90 lux for 2000 hours per year or more</td>
</tr>
</tbody>
</table>

**Crèche buildings**

All occupied spaces, unless indicated in [Daylighting relevant building areas on page ci](#)

<table>
<thead>
<tr>
<th>Credits</th>
<th>Minimum area to comply</th>
<th>Average daylight illuminance (averaged over entire space)</th>
<th>Minimum daylight illuminance at worst lit point</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>80%</td>
<td>At least 300 lux for 2000 hours per year or more</td>
<td>At least 90 lux for 2000 hours per year or more</td>
</tr>
</tbody>
</table>

**Courts, Industrial and all Other building types**

All occupied spaces, unless indicated in [Daylighting relevant building areas on page ci](#)

<table>
<thead>
<tr>
<th>Credits</th>
<th>Minimum area to comply</th>
<th>Average daylight illuminance (averaged over entire space)</th>
<th>Minimum daylight illuminance at worst lit point</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>80%</td>
<td>At least 300 lux for 2000 hours per year or more</td>
<td>At least 90 lux for 2000 hours per year or more</td>
</tr>
</tbody>
</table>

### Table 13 Additional alternative route for healthcare building types only

<table>
<thead>
<tr>
<th>Healthcare Buildings</th>
<th>Credits</th>
<th>Median daylight factor</th>
<th>Minimum daylight factor</th>
<th>Minimum area to comply</th>
</tr>
</thead>
<tbody>
<tr>
<td>Staff and public areas</td>
<td>1</td>
<td>2%</td>
<td>0.6%</td>
<td>80%</td>
</tr>
<tr>
<td>Occupied patients areas (dayrooms, wards) and consulting rooms</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Staff and public areas</td>
<td>2</td>
<td>2%</td>
<td>0.6%</td>
<td>80%</td>
</tr>
<tr>
<td>Occupied patients areas (dayrooms, wards) and consulting rooms</td>
<td></td>
<td>3%</td>
<td>0.9%</td>
<td>80%</td>
</tr>
</tbody>
</table>

#### One credit - View out

5. 95% of the floor area in 95% of spaces for each relevant building area is within 8m of a wall. The wall has a window or permanent opening that provides an adequate view out.

6. The window or opening must be 20% of the surrounding wall area (refer to Definitions on page ci). Where the room depth is greater than 8m, compliance is only possible where the percentage of window or opening is the same as, or greater than, the values in Table 1.0 of BS 8206(42).

7. In addition, the building type criteria in Table 14 below are applicable to view out criteria.

### Table 14 View out building specific requirements

<table>
<thead>
<tr>
<th>Building type</th>
<th>View out requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prison buildings</td>
<td>Cells</td>
</tr>
<tr>
<td>Building type</td>
<td>View out requirements</td>
</tr>
<tr>
<td>---------------</td>
<td>-----------------------</td>
</tr>
<tr>
<td>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 ( \geq 10 ) m. Where existing features prevent compliance with this criteria in less than 20% of the cells within the building, the credit can still be awarded.</td>
<td></td>
</tr>
</tbody>
</table>

**Patient occupied spaces**

See healthcare requirements for these spaces.

| Multi-residential buildings | Self-contained flats - living rooms
Sheltered housing - communal lounges, individual bedrooms and bedsits
All positions within relevant areas are to be within 5m of a wall which has a window or permanent opening providing an adequate view out. The window or opening must be \( \geq 20\% \) of the surrounding wall area. |

| Healthcare buildings with inpatient areas (one additional credit) | Patient occupied spaces, e.g. wards and dayrooms
As criteria 4 and 5 for the relevant building areas PLUS the distance between the wall with the window or opening and nearest external solid object (e.g., buildings, screens, walls or fences) is \( \geq 10 \) m. |

One credit - Internal and external lighting levels, zoning and control

**Internal lighting**

8 Internal lighting in all relevant areas of the building is designed to provide illuminance (lux) levels and colour rendering index in accordance with the SLL Code for Lighting 2012 and any other relevant industry standard. Internal lighting should be appropriate to the tasks undertaken, accounting for building user concentration and comfort levels.

9 For areas where computer screens are regularly used, the lighting design complies with CIBSE Lighting Guide 7 (43) sections 2.4, 2.13 to 2.15, 2.20, and 6.10 to 6.20. This gives recommendations highlighting:

9.a: Limits to the luminance of the luminaires to avoid screen reflections. (Manufacturers’ data for the luminaires should be sought to confirm this.)

9.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.

9.c: Recommendations for direct lighting, ceiling illuminance, and average wall illuminance.

**External lighting**

10 All external lighting located within the construction zone is specified in accordance with BS 5489-1:2013 Lighting of roads and public amenity areas (44) and BS EN 12464-2:2014 (45) Light and lighting - Lighting of work places - Part 2: Outdoor work places. External lighting should provide illuminance levels that enable users to perform outdoor visual tasks efficiently and accurately, especially during the night.

11 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 on the basis of compliance with criteria 8 above – 9.c above.

**Zoning and occupant control**

12 Internal lighting is zoned to allow for occupant control. Zoning is in accordance with the criteria below for relevant areas present within the building:

12.a: Office areas, zones of no more than four workplaces
12.b: Workstations adjacent to windows or atria and other building areas separately zoned and controlled
12.c: Seminar and lecture rooms; zoned for presentation and audience areas
12.d: Library spaces: separate zoning of stacks, reading and counter areas
12. eTeaching space or demonstration area
12. fWhiteboard or display screen
12. gAuditoria: zoning of seating areas, circulation space and lectern area
12. hDining, restaurant, café areas: separate zoning of servery and seating or dining areas
12. iRetail: separate zoning of display and counter areas
12. jBar areas: separate zoning of bar and seating areas
12. kWards or bedded areas: zoned lighting control for individual bed spaces and control for staff over groups of bed spaces
12. lTreatment areas, dayrooms, waiting areas: zoning of seating and activity areas and circulation space with controls accessible to staff.

13 Areas used for teaching, seminar or lecture purposes have lighting controls provided in accordance with CIBSE Lighting Guide 5(46).

14 In addition the building type criteria in Table 15 below (where relevant).

<table>
<thead>
<tr>
<th>Building type</th>
<th>Internal and external lighting requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Education buildings</td>
<td>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.</td>
</tr>
<tr>
<td>Prison buildings</td>
<td><strong>Cells</strong>&lt;br&gt;Light 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.&lt;br&gt;<strong>Exercise yards</strong>&lt;br&gt;Light 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.</td>
</tr>
<tr>
<td>Court buildings</td>
<td>Separate zoning is also provided for the following areas (as a minimum):&lt;br&gt;1. Judge’s or magistrate’s bench&lt;br&gt;2. Dock&lt;br&gt;3. Jury area&lt;br&gt;4. Public seating area.&lt;br&gt;Lighting control of the zones in the above spaces, and the court as a whole, cater for the following settings:&lt;br&gt;1. Full lighting (to allow cleaning etc.)&lt;br&gt;2. Normal lighting (for court sessions)&lt;br&gt;3. Dimmed (for the purpose of showing audio-visual evidence, but allowing enough light for note taking).</td>
</tr>
<tr>
<td>Small spaces (less than 40m²)</td>
<td>Buildings consisting entirely of small rooms or spaces (less than 40m²) which do not require any subdivision of lighting zones or control will meet the zoning criteria by default.</td>
</tr>
<tr>
<td>Lighting zoning and control - auditoria spaces</td>
<td>The controls specified will depend on the size and use of the space but a typical auditorium or lecture theatre with stepped seating and a formal lectern, demonstration or performance area would typically be expected to have lighting controls as follows:&lt;br&gt;1. Full normal lighting (to allow for entry, exit, cleaning etc.)&lt;br&gt;2. Demonstration area lighting off and audience area lighting reduced to a low level (for the purpose of line side projection, but allowing enough light for the audience to take notes)&lt;br&gt;3. All lighting off (for the projection of tone slides, colour slides, and for the purposes of visual demonstrations or performances)</td>
</tr>
</tbody>
</table>
Building type | Internal and external lighting requirements
--- | ---
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).

**Exemplary level criteria**

To achieve an exemplary performance credit for daylighting:

15. Daylighting criteria have been met using either of the following options:

15.a Relevant building areas meet exemplary daylight factors and the relevant criteria in Table 16 below.

15.b Relevant building areas meet exemplary average and minimum point daylight illuminance criteria in Table 17 on the next page.

To achieve an exemplary performance credit for internal and external lighting levels, zoning and control:

16. Lighting in each zone can be manually dimmed by occupants down to 20% of the maximum light output using dimmer switches positioned in accessible locations. Dimming and control gear should avoid flicker and noise.

### Table 16 Exemplary level values of average daylight factor required.

<table>
<thead>
<tr>
<th>Area type</th>
<th>Credits</th>
<th>Average daylight factor required</th>
<th>Minimum area (m²) to comply</th>
<th>Other requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>All building types</td>
<td></td>
<td>The criteria outlined in Table 10 and Table 11 on page xcii concerning uniformity ratio (a), view of sky (b) or room depth criterion (c) are met where they are used to demonstrate compliance.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>All building types (excluding retail – see below)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Functions as identified in the standard criteria (multi-storey buildings)</td>
<td>1</td>
<td>3%</td>
<td>80%</td>
<td>Where used, a minimum point daylight factor of 1.2% or 2.1% for spaces with glazed roofs, such as atria</td>
</tr>
<tr>
<td>Functions as identified in the standard criteria (single storey buildings)</td>
<td></td>
<td>4%</td>
<td>80%</td>
<td>Where used, a minimum point daylight factor of 1.6% or 2.8% for spaces with glazed roofs, such as atria</td>
</tr>
<tr>
<td>Prisons and court cells</td>
<td></td>
<td>2%</td>
<td>80%</td>
<td>N/A</td>
</tr>
<tr>
<td>Prison internal association or atrium area</td>
<td></td>
<td>5%</td>
<td>80%</td>
<td>A uniformity ratio of at least 0.7 or a minimum point daylight factor of 3.5%</td>
</tr>
<tr>
<td>Retail</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sales areas</td>
<td>1</td>
<td>N/A</td>
<td>50%</td>
<td>A minimum point daylight factor of 2% must be achieved in the compliant areas. Assess total sales areas without rounding up to the nearest room.</td>
</tr>
<tr>
<td>Common areas and offices (multi-storey buildings)</td>
<td></td>
<td>3%</td>
<td>80%</td>
<td>Where used, a minimum point daylight factor of 1.2% or 2.1% for spaces with glazed roofs, such as</td>
</tr>
</tbody>
</table>
Area type | Credits | Average daylight factor required | Minimum area (m²) to comply | Other requirements
---|---|---|---|---
Common areas and offices (single storey buildings) | | 4% | 80% | Where used, a minimum point daylight factor of 1.6% OR 2.8% for spaces with glazed roofs, such as atria

Table 17 Exemplary level illuminance value requirements. Both criteria (average illuminance and minimum point illuminance) should be met.

<table>
<thead>
<tr>
<th>Area type</th>
<th>Credits</th>
<th>Minimum area to comply</th>
<th>Average daylight illuminance (averaged over entire space)</th>
<th>Minimum daylight illuminance at worst lit point</th>
</tr>
</thead>
<tbody>
<tr>
<td>All building types (excluding retail – see below)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Multi-storey buildings Occupied spaces (unless indicated below)</td>
<td>1</td>
<td>80%</td>
<td>At least 300 lux for 2650 hours per year or more</td>
<td>At least 90 lux for 2650 hours per year or more</td>
</tr>
<tr>
<td>Single storey buildings Occupied spaces (unless indicated below)</td>
<td></td>
<td>80%</td>
<td>At least 300 lux for 3000 hours per year or more</td>
<td>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</td>
</tr>
<tr>
<td>Prisons and courts buildings Cells and custody cells</td>
<td></td>
<td>80%</td>
<td>At least 100 lux for 3450 hours per year or more</td>
<td>N/A</td>
</tr>
<tr>
<td>Prison buildings Internal association or atrium areas</td>
<td></td>
<td>80%</td>
<td>At least 300 lux for 3250 hours per year or more</td>
<td>At least 210 lux for 3250 hours per year or more</td>
</tr>
<tr>
<td>Retail buildings Sales areas</td>
<td>1</td>
<td>50%</td>
<td>At least 300 lux point daylight illuminances for 2000 hours per year or more</td>
<td></td>
</tr>
<tr>
<td>Retail buildings Other occupied areas</td>
<td></td>
<td>80%</td>
<td>Select relevant criteria above for occupied spaces dependent on whether you are assessing a multi-storey or single-storey building.</td>
<td></td>
</tr>
</tbody>
</table>

Reflectance for maximum room depths and window head heights

The table below gives maximum room depths in metres for different room widths and window head heights of side-lit rooms.
Table 18 Reflectance for maximum room depths and window head heights

<table>
<thead>
<tr>
<th>Reflectance (RB)</th>
<th>0.4</th>
<th>0.5</th>
<th>0.6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Room width (m)</td>
<td>3</td>
<td>10</td>
<td>3</td>
</tr>
<tr>
<td>Window head height (m)</td>
<td>2.5</td>
<td>4.5</td>
<td>6.7</td>
</tr>
<tr>
<td></td>
<td>3.0</td>
<td>5.0</td>
<td>7.7</td>
</tr>
<tr>
<td></td>
<td>3.5</td>
<td>5.4</td>
<td>8.6</td>
</tr>
</tbody>
</table>

Compliance notes

Compliance notes are located in Appendix G — Notes for compliance on page 18 for the consultation. These compliance notes will be available through the knowledge base when the scheme goes live.

Methodology

Glare control

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 or modelling of the relationship between sunlight and the building. Design studies can be used to demonstrate that sunlight cannot reach the eyes of building occupants, or the computer screens they are using, during occupied hours.

Assessing compliant forms of glare control

Control of glare from the sun is required in spaces with computer workstations such as offices, laboratories, study bedrooms, libraries, control rooms and reception desks. It is also required in spaces where people have to spend time in fixed locations such as classrooms, hospital wards, court rooms and factory production lines.

Compliant shading measures for meeting glare control criteria can include:

- building integrated measures (e.g. overhangs or fins)
- occupant controlled devices such as opaque Venetian or close weave (fabric blinds, where the openness factor of blinds is 1% or less, and where the fabric light transmittance value is < 0.1 (10%))
- external shading or brise soleil.

or combination of the above.

Glare control must provide shading from both high level summer and low level winter sun. 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.

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 in to the space. A such, the use of curtains to control glare is likely to cause occupants to rely more on artificial lighting.

Daylight issue calculations

Calculating the percentage of assessed area

The percentage of the total floor area of all relevant rooms must comply where the criteria specify a percentage of floor area must have adequate daylight illuminance. For example, six relevant rooms each have a floor area of 150m² 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. The number of rooms must always be rounded up so, in this example, five rooms must comply to achieve the credit.

Using the point daylight factor to determine compliance for retail sales areas, the minimum percentage area is based on the total floor area being assessed. Individual ‘rooms’ or sub-areas do not need to meet the minimum thresholds. This allows for typical building form restrictions and layout configurations for these types of spaces.

**External obstructions**

In calculating minimum and average daylight factors and daylight illuminances, external obstructions should be taken into account. For illuminance calculations, the reflectance of external obstructions should be taken as 0.2 unless on-site measurements of external reflectance have been made.

**Dirt factors**

Daylight calculations should include a maintenance factor for dirt on the windows, as given in British Standard Code of Practice for daylighting, BS 8206 Part 2, appendix A1.3.

**Borrowed light**

For areas where borrowed light is used to demonstrate compliance with daylighting criteria, calculations or results from appropriate lighting design software must be provided to demonstrate that such areas meet the BREEAM criteria (if the light from these sources is required in order for the room to comply). Examples of borrowed light include: light shelves, clerestory glazing, sun pipes or internal translucent or transparent partitions (such as those using frosted glass).

**Room depth criterion- rooms lit from two opposite sites or via rooflights**

For rooms lit by windows on two opposite sides, the maximum room depth that can be satisfactorily illuminated by daylight is twice the limiting room depth (d) (measured from window wall to window wall; CIBSE Lighting Guide LG10. The reflectance of the imaginary internal wall should be taken as 1.

The room depth criteria cannot be used where the lighting strategy relies on rooflights. In such areas either appropriate software has to be used to calculate the uniformity ratio or, in the case of a regular array of rooflights across the whole of the space, figure 2.11 (page 17) within CIBSE Lighting Guide ‘LG10: Daylighting- a guide for designers’ can be used to determine the uniformity ratio.

**Uniformity ratio calculation**

The uniformity ratio calculation, minimum point daylight factor and minimum daylight illuminance can exclude areas within 0.5m of walls. Areas within 0.5m are not regarded as part of the working plane for this purpose, although they are included in the average daylight factor and average daylight illuminance calculations.

**View of sky calculation**

To comply with the view of sky criterion (ref (b)) in Table 11 on page xcii, at least 80% of the room that complies with the average daylight factor requirement must receive direct light from the sky, i.e. it is permissible for up to 20% of the room not to meet the view of sky requirement and still achieve a compliant room.

**Alternative route for healthcare buildings**

For the calculation of median daylight factor using a grid of point daylight factors, the spacing of grid points should not be greater than that given in section 4.4 of EN12464-1 Light and lighting- Lighting of workplaces Part 1: Indoor workplaces. Table 19 below gives the recommended number of grid points in each linear dimension. For example, a space 5m x 5m would have $8 \times 8 = 64$ grid.

In the calculations for the median daylight factor the areas within the space which are permanently occupied should be used; this may exclude areas close to the walls unless work stations are located there.

**Table 19** Recommended number of grid points

<table>
<thead>
<tr>
<th>Length of the area (m)</th>
<th>Maximum distance between grid points (m)</th>
<th>Minimum number of grid points</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
The median daylight factor in an area is the daylight factor exceeded over 50% of the working plane in that area.

**Internal and external lighting levels, zoning and control**

**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 personable 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 on the basis of 40m² grids, i.e. an assumption of 1 person or workspace per m².

**Evidence**

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Interim design stage</th>
<th>Final post-construction stage</th>
</tr>
</thead>
<tbody>
<tr>
<td>All</td>
<td>One or more of the appropriate evidence types listed in <em>The BREEAM evidential requirements on page 38</em> can be used to demonstrate compliance with these criteria.</td>
<td>Refer to generic evidence requirement above</td>
</tr>
<tr>
<td>3, 4</td>
<td>Daylighting calculations</td>
<td></td>
</tr>
</tbody>
</table>

**Definitions**

**Accessible locations**

An accessible location for dimming switches is a location that can be easily accessed by all of the building users in that zone.

**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 (1.2 – 1.3m) 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. In addition to this, an external view out can offer positive effects on health and wellbeing that cannot be offered by an internal view.

**Average daylight factor**

The average daylight factor is the average indoor illuminance (from daylight) on the working plane within a room. This is expressed as a percentage of the simultaneous outdoor illuminance on a horizontal plane under an unobstructed CIE Standard Overcast Sky.

**Clinical areas**

Areas of the building in which medical functions are carried out that require specific restricted environmental conditions such as humidity, daylighting, temperature, etc. (e.g. X-ray, operating department, delivery room, etc.).

**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. This includes the external site areas that fall within the scope of the new works.

**Daylight factor**

The daylight factor is defined as the ratio of the illuminance at a point on a given plane due to the light received directly or indirectly from a sky assumed or known illuminance distribution, to the illuminance on a horizontal plane due to an unobstructed hemisphere of this sky, excluding the contribution of direct sunlight to both illuminances.

**Daylighting relevant building areas**

For the purpose of BREEAM this is defined as areas within the building where good daylighting is considered to be of benefit to the building users (typically those areas occupied continuously for 30 minutes or more). This includes the following (where occupied continuously for 30 minutes or more) 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 at all times.
3. Self-contained flats
4. Kitchen and catering areas
5. General communal areas
6. Small offices (including those within multi-residential buildings)
7. Meeting rooms
8. General communal areas
9. Small offices (including those within multi-residential buildings)
10. Meeting rooms (including those within multi-residential buildings)
11. Leisure areas
12. 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.
3. 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.

4. 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.

**Glare control relevant building areas**

For glare control include areas of the building where lighting and resultant glare could be problematic for users, e.g. those areas that have been designed to contain or use workstations, projector screens etc. and sports halls. Spaces in the categories described above, for which daylight and view out are excluded, should not be assessed against the glare control criteria.

**Illuminance**

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

**Internal and 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. The credit can be awarded on the basis of compliance with the internal lighting criteria. 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).

**Lighting zoning**

For rooms or spaces not listed within 12 on page xcv, the assessor can exercise an element of judgment when determining whether the specification is appropriate for the space given its end use, and the aim and criteria of this BREEAM issue.

**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. Please note there is a specific, unrelated, definition of ‘unoccupied’ with reference to acoustic testing and measurement and this should not be confused with the definition used here.

**Patient areas**

Areas of the building used mainly by inpatients (e.g. wards, dayrooms, etc.).

**Point daylight factor**

A point daylight factor is expressed as a percentage based on the ratio of the daylight illuminance at a specific point on the working plane within a room compared with the illuminance on an outdoor unobstructed horizontal plane. An overcast sky is assumed by the ‘CIE (Commission Internationale de l’Eclairage) overcast sky’. For points on the working plane:

- Minimum point daylight factor is the lowest value daylight factor at a point that is not within 0.5m of a wall.
- Minimum illuminance is illuminance at the worst lit point that is not within 0.5m of a wall.
- These points usually occur close to a rear corner of the room. Computer simulations are the most appropriate tools to allow for point daylight factors and illuminances to be calculated.

**Public areas**

Within a healthcare building type, this includes areas of the building designed for public use where no medical functions are carried out (e.g. reception, retail unit, waiting areas).
Separate zoning 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.

Staff areas
Areas of the building used mainly by staff (e.g. offices, meeting rooms, staff rooms) and medical areas where patients are admitted but that do not require restricted environmental conditions (e.g. consulting rooms, physiotherapy, etc.).

Surrounding wall area
Surrounding wall area refers to the area (in m²) of the internal wall on which the window or opening is located, including the area of the window or opening itself.

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

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

View out relevant building areas
BREEAM defines relevant building areas requiring a view out to include areas of the building where:

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.

Excluded areas for each of these might include:

1. Nurse bases where they are located centrally in a ward or patient area in order to enable patient observation.
2. Courts and interview rooms where compliance is not possible due to security or privacy criteria.
3. Prison staff areas containing workstations that for security or observational purposes must be located centrally within the building.
4. Any clinical areas where the control of environmental or operational conditions prevents such spaces from providing a view out.
5. Conference rooms, lecture theatres, sports halls, acute SEN and also any spaces where the exclusion or limitation of natural light is a functional requirement, e.g. laboratories, media spaces, etc.
6. Isolated work station for intermittent, short term work, e.g. work station within a server room

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

Internal and external lighting levels, zoning and control

Relevant industry standards for lighting design

For preschools, schools and sixth form colleges, the following can be considered a relevant industry standard for lighting design:

- Building Bulletin 90: ‘Lighting Design for Schools’

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 multi-residential buildings, CIBSE SLL LG9(47) can be considered as a relevant standard in addition to, or instead of SLL Code for Lighting 2012.

Please note that the illuminance levels specified in the SLL Code for Lighting, 2012 align with BS EN 12464-1.

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 02 Indoor air quality

Aim

To encourage and support healthy internal environments with good indoor air quality.

Value

- Reduces the potential for indoor air pollution from a variety of pollution sources
- Supports the physical health of building occupants by reducing the risk of health concerns associated with indoor air pollution
- Supports building occupant comfort and productivity

Context

It is widely accepted that the quality of the indoor environment can impact occupant health. Poor indoor air quality can have a range of negative impacts on the physical health of building occupants. These effects can include
immediate impacts such as eye, nose and throat irritation, headaches, dizziness and fatigue, while also contributing to more long-term health issues such as asthma, respiratory diseases, heart disease and cancer.

Further to this, through the Control of Substances Hazardous to Health (COSHH) Regulations (2002), in workplaces employers are required to control any substance in the workplace that may be hazardous to health.

As a result, measures need to be taken to ensure the internal environment maintains good air quality and reduces the presence of common indoor air pollutants such as carbon dioxide, nitrogen dioxide, and volatile organic compounds.

The quality of the indoor environment is a complex combination of both externally and internally generated pollutants, which may be compounded by occupant behaviour.

Producing a project specific indoor air quality plan leads to building design, specification of products and installation of ventilation systems that will minimise indoor air pollution.

Assessment scope

<table>
<thead>
<tr>
<th>Applicable assessment criteria</th>
<th>Fully fitted</th>
<th>Simple building</th>
<th>Shell and core</th>
<th>Shell only</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assessment type specific notes</td>
<td>None</td>
<td>None</td>
<td>see ref 1.0</td>
<td>None</td>
</tr>
</tbody>
</table>

**Assessment type specific**

1.0 **Ventilation**

If ventilation systems are not within the remit of the shell and core developer, compliance can be demonstrated through the building servicing strategy where this is predetermined by the built form or core services provision.

**Building type specific**

2.0 **Industrial**

This issue’s criteria only apply to office areas and not to operational areas. If the industrial building does not contain any office areas, this issue is not applicable.
Hea 02 Indoor air quality

Assessment criteria

This issue is split into five parts:

- Indoor air quality (prerequisite)
- Ventilation (one credit)
- User control (one credit)
- Emissions from building products (two credits)
- Post-construction indoor air quality measurement (one credit)

Prerequisite- Indoor air quality (IAQ) plan

1 A site-specific indoor air quality plan has been produced and implemented. The objective of the plan is to facilitate a process that leads to design, specification and installation decisions and actions that minimise indoor air pollution during occupation of the building. The indoor air quality plan must consider the following:

1.a: Removal of contaminant sources
1.b: Dilution and control of contaminant sources
1.c: Procedures for pre-occupancy flush out
1.d: Third party testing and analysis
1.e: Maintaining good indoor air quality in-use

One credit- Ventilation

2 The building has been designed to minimise the indoor concentration and recirculation of pollutants in the building as follows:

2.a: Provide fresh air into the building in accordance with the criteria of the relevant standard for ventilation.
2.b: Ventilation pathways are designed to minimise the ingress and build-up of air pollutants inside the building (see Methodology on page c6).
2.c: Where present, HVAC systems must incorporate suitable filtration to minimise external air pollution, as defined in BS EN 13779:2007 Annex A3(48). The specified filters should achieve a minimum Indoor Air Quality of IDA2.
2.d: Areas of the building subject to large and unpredictable or variable occupancy patterns have carbon dioxide (CO₂) or air quality sensors specified and:

2.d.i In mechanically ventilated buildings or spaces: sensors are linked to the mechanical ventilation system and provide demand-controlled ventilation to the space.

2.d.ii In naturally ventilated buildings or spaces: sensors either have the ability to alert the building owner or manager when CO₂ 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.

One credit - User control

3 The natural ventilation strategy is capable of providing at least two levels of user-control on the supply of fresh
Two credits - Emissions from building products
4 All product types listed in Table 21 meet the emission limits, testing requirements and any additional requirements listed in Table 21.

One credit - Post-construction indoor air quality measurement
5 The formaldehyde concentration in indoor air is measured post construction (but pre-occupancy) and does not exceed 100µg/m³ averaged over 30 minutes (World Health Organisation guidelines for indoor air quality: Selected pollutants, 2010).[49]
6 The formaldehyde sampling and analysis is performed in accordance with ISO 16000-2[50] and ISO 16000-3.[51]
7 The total volatile organic compound (TVOC) concentration in indoor air is measured post construction (but pre-occupancy) and does not exceed 500µg/m³ over 8 hours.
8 The TVOC sampling and analysis is performed in accordance with ISO 16000-5[52] and ISO 16000-6[53] or ISO 16017-1[54].
9 Where levels are found to exceed these limits, the project team confirms the measures that have, or will be, undertaken in accordance with the IAQ plan, to reduce the TVOC and formaldehyde levels to within the above limits.
10 The measured concentration levels of formaldehyde (µg/m³) and TVOC (µg/m³) are reported, via the BREEAM Scoring and Reporting Tool.

Exemplary level criteria

Minimising sources of air pollution - Emissions from building products
To achieve one exemplary performance credit:

One credit
11 All product types listed in Table 20 meet the emission limits, testing requirements and any additional requirements listed in Table 20.

Table 20: Exemplary level emission criteria by product type

<table>
<thead>
<tr>
<th>Product type (see CN7.2)</th>
<th>Emission limit</th>
<th>Additional requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Formaldehyde</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Total volatile organic compounds (TVOC)#</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Total semi-volatile organic compounds (TSVOC)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Category 1A and 1B carcinogens</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Testing requirement (see CN7.3 and CN7.4)</td>
<td></td>
</tr>
</tbody>
</table>

| 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 CEN/TS 16516 or CDPH Standard Method v1.1 | Meet VOC content limits (Table 22 on page cxx). Paints used in wet areas (e.g. bathrooms, kitchens, utility) |

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<table>
<thead>
<tr>
<th>Product type (see CN7.2)</th>
<th>Emission limit</th>
<th>Additional requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Formaldehyd e</td>
<td>Total volatile organic compounds (TVOC)</td>
</tr>
<tr>
<td>Wood-based products including wood flooring</td>
<td>≤ 0.06 mg/m³ and zero added formaldehyde resin or adhesive</td>
<td>≤ 0.3 mg/m³</td>
</tr>
<tr>
<td>Flooring materials (including floor levelling compounds and resin flooring)</td>
<td>≤ 0.01 mg/m³</td>
<td>≤ 0.3 mg/m³</td>
</tr>
<tr>
<td>Ceiling, wall, and acoustic and thermal insulation materials</td>
<td>≤ 0.01 mg/m³</td>
<td>≤ 0.3 mg/m³</td>
</tr>
<tr>
<td>Interior adhesives and sealants (including flooring adhesives)</td>
<td>≤ 0.01 mg/m³</td>
<td>≤ 0.3 mg/m³</td>
</tr>
</tbody>
</table>
**Methodology**

**Ventilation**

The design of air-conditioned and mixed-mode buildings should minimise the build-up of air pollutants. Locations of ventilation intakes and airflow pathways should be designed in accordance with any 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. BS EN 13779:2007 Annex 2(55)
   b. BRE FB 30 Ventilation for healthy buildings: Reducing the impact of urban air pollution (2011)(56)
   c. BRE P 9/14 Locating ventilation intakes to reduce ingress of external pollutants into buildings(57) as appropriate, and
   d. CIBSE TM21(58).
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 on page 20).
3. Positioning the building’s air intakes and exhausts at least 10m of horizontal distance apart. Positioning intakes at least 10m horizontal distance from sources of external pollution (including the location of air exhausts from other buildings). The building’s air intakes and exhausts should be located to reduce the intake air being contaminated by the exhausts. Exhausts or other pollutant sources should not be discharged into enclosed spaces, such as courtyards, in which intakes are also located.

Where a site is located within an Air Quality Management Area (AQMA) affected by gaseous pollutants (e.g. NOx), the design should adopt a strategy that minimises indoor air quality impacts arising from local high pollution levels.

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**Compliance notes**

Compliance notes are located in Appendix G – Notes for compliance on page 18 for the consultation. These compliance notes will be available through the knowledge base when the scheme goes live.
Where this approach involves the use of gas phase filtration, these should be tested in accordance with BS EN ISO 10121 1:2014 (BS 2014) *Test method for assessing the performance of gas-phase air cleaning media and devices for general ventilation*\(^\text{(59)}\). Design teams must ensure that filter performance is appropriate for the pollutant conditions experienced at the site.

The design of naturally ventilated buildings should minimise the build-up of air pollutants. Ventilation intakes and airflow pathways should be designed using the following methods;

- Following guidance given in;
  - BRE FB 30 Ventilation for healthy buildings: Reducing the impact of urban air pollution (2011),
  - BRE IP 9/14 Locating ventilation intakes to reduce ingress of external pollutants into buildings (2014), and,
  - CIBSE TM21 Minimising pollutants at air intakes (1999), as appropriate.

These give guidance on ventilation strategies, and the optimum location of ventilation inlets, openable windows, and trickle and background ventilators to reduce ingress of external pollutants into buildings.

- Positioning openable windows/ and background ventilators over at least 10m of horizontal distance from sources of external pollution (including the location of any building related air exhausts).

**User Control**

For user control, the two levels of ventilation must be able to achieve the following:

- Higher level: higher rates of ventilation achievable to remove short term odours or prevent summertime overheating
- Lower level: adequate levels of draught-free fresh air to meet the need for good indoor air quality throughout the year, sufficient for the occupancy load and the internal pollution loads of the space.

Any opening mechanisms must be easily accessible and provide adequate user-control over air flow rates to avoid draughts. Relevant industry standards for ventilation can be used to define 'adequate levels of fresh air' sufficient for occupancy and internal air pollution loads relevant to the building type.

Multi-residential buildings with self-contained flats and individual bedrooms must have a degree of openable window function. This does not need to provide two levels of user-control (as required above), but must be occupant controlled.

**Sampling and analysis of indoor air and analysis of emissions from building products**

**Accreditation of organisations performing sampling or laboratory analysis**

All organisations used for sampling and analysis of indoor air or for analysis of emissions from building products must be accredited to ISO/IEC 17025\(^\text{(60)}\) with specific accreditation covering:

- Sampling: Pumped sampling for formaldehyde in air; Pumped sampling for VOCs in air
- Chemical analysis: Determination of formaldehyde; Determination of VOCs

Sampling and chemical analysis of indoor air can be performed by separate organisations, but both must be accredited.

**Self-declaration of emission levels from building products**

Manufacturers self-declaration of emission levels from building products is acceptable if 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 VOC emitting substances.
Emission from building products

Scope of assessment of emissions from building products

The scope of the VOC credit issues does not extend to furnishings, e.g. desks or shelving, it focuses on the key internal finishes and fittings integral to the building.

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.

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 organic-based coatings, binders, or sealants are used in their production or finishes.

When assessing paints used in wet areas, evidence must be provided to show that the paints 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(61) and EN 15458(62).

All products specified for a project that fall within one of the product types listed in Table 21 below and Table 20 on page cxv 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 BREEM 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.

Guidance note 2.2 available from the BREEM website provides a list of approved alternative schemes recognised by BREEM 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 BREEM office (breeam@bre.co.uk) for details of the application process.

Table 21: Emission criteria by product type

<table>
<thead>
<tr>
<th>Product type</th>
<th>Emission limit*</th>
<th>Total volatile organic compounds (TVOC)</th>
<th>Category 1A and 1B carcinogens</th>
<th>Testing requirement</th>
<th>Additional requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interior paints and coatings</td>
<td>≤ 0.06 mg/m³</td>
<td>≤ 1.0 mg/m³</td>
<td>≤ 0.001 mg/m³</td>
<td>EN 16402 (63) or ISO 16000-9 (64) or CEN/TS 16516 (65) or CDPH Standard</td>
<td>Meet TVOC content limits (See Table 22 on page cxv), Paints used in wet areas (e.g. bathrooms, kitchens, utility rooms) should protect against...</td>
</tr>
<tr>
<td>Product type</td>
<td>Emission limit*</td>
<td>Additional requirements</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>------------------------------------------------------------------------------</td>
<td>-------------------------------------------------------------------------------</td>
<td>----------------------------------------------------------------------------------------</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Formaldehyde</td>
<td>Testing requirement</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wood-based products (including wood flooring)</td>
<td>≤ 0.06 mg/m³ (Non-MDF) ≤ 0.08 mg/m³ (MDF)</td>
<td>Method v1.1 (66)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>≤ 1.0 mg/m³</td>
<td>mould growth (See Methodology on page oiii)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>≤ 0.001 mg/m³</td>
<td>N/A</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flooring materials (including floor levelling compounds and resin flooring)</td>
<td>≤ 0.06 mg/m³</td>
<td>ISO 10580 or ISO 16000-9 or CEN/TS 16516 or CDPH Standard Method v1.1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>≤ 1.0 mg/m³</td>
<td>N/A</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>≤ 0.001 mg/m³</td>
<td>N/A</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ceiling, wall, and acoustic and thermal insulation materials</td>
<td>≤ 0.06 mg/m³</td>
<td>N/A</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Interior adhesives and sealants (including flooring adhesives)</td>
<td>≤ 0.06 mg/m³</td>
<td>N/A</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* 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.

* 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.

# See Methodology on page oiii.

---

**Formaldehyde**

- **Total volatile organic compounds (TVOC)**
- **Category 1A and 1B carcinogens**
### Table 22 Maximum TVOC content for paints and coatings

<table>
<thead>
<tr>
<th>Product category</th>
<th>Free TVOC content of ready-to-use product (g/l)</th>
<th>Testing requirements (see CN7.4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interior matt walls and ceilings (Gloss &lt;25 @60°)</td>
<td>10</td>
<td>ISO 11890-2 or ISO 17895 or Calculation based on the ingredients and raw materials</td>
</tr>
<tr>
<td>Interior glossy walls and ceilings (Gloss &gt;25 @60°)</td>
<td>40</td>
<td></td>
</tr>
<tr>
<td>Interior trim and dadoing paints for wood and metal</td>
<td>90</td>
<td></td>
</tr>
<tr>
<td>Interior trim varnishes and wood stains, including opaque wood stains</td>
<td>65</td>
<td></td>
</tr>
<tr>
<td>Interior minimal build wood stains</td>
<td>50</td>
<td></td>
</tr>
<tr>
<td>Primers</td>
<td>15</td>
<td></td>
</tr>
<tr>
<td>Binding primers</td>
<td>15</td>
<td></td>
</tr>
<tr>
<td>One-pack performance coatings</td>
<td>100</td>
<td></td>
</tr>
<tr>
<td>Two-pack reactive performance coatings for specific end use such as floors</td>
<td>80</td>
<td></td>
</tr>
<tr>
<td>Multi-coloured coatings</td>
<td>80</td>
<td></td>
</tr>
<tr>
<td>Decorative effect coatings</td>
<td>80</td>
<td></td>
</tr>
</tbody>
</table>

### Post-construction indoor air quality measurement

**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 21 on page cxiii and Table 20 on page cx. BREEAM Assessors must submit details of any alternative standards to BRE Global for approval prior to awarding any credits for this issue.

### Evidence

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Interim design stage</th>
<th>Final post-construction stage</th>
</tr>
</thead>
<tbody>
<tr>
<td>All</td>
<td>One or more of the appropriate evidence types listed in The BREEAM evidential requirements on page 38 can be used to demonstrate compliance with these criteria.</td>
<td></td>
</tr>
</tbody>
</table>

### Definitions

**Areas with a large and unpredictable occupancy**

The following are examples of these types of space:

- Auditoria
- Gyms
- Retail stores or malls
– Cinemas
– Waiting rooms.
Where the assessed building does not have any areas deemed to be large with an unpredictable pattern of occupancy, the criterion does not apply.

Category 1A and 1B carcinogens
Carcinogenic compounds detectable by the VOC emission testing requirements in Table 1 and Table 2 and that are classified as category 1A or 1B carcinogens in Annex V to Regulation (EC) No. 1272/2008 on classification, labelling and packaging of substances and mixtures(72), which are listed as carcinogenic VOCs in Annex G.2 of prEN 16516 (draft)(73).

Clinical areas
Areas of the building in which medical functions are carried out that require specific restricted environmental conditions such as humidity, daylighting, temperature, etc. (e.g. X-ray, operating department, delivery room, etc.).

Competent individual- Wind tunnel modelling
An individual with one or more of the following qualifications and experience can be considered to be a ‘competent individual’ for the purpose of carrying out wind tunnel modelling:

– 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.
– 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 considered to be a ‘competent individual’ for the purpose of carrying out numerical modelling:

– 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,
– Demonstrated ability to interpret environmental guidelines, policies, plans and legislative requirements.

Numerical Modelling
Numerical modelling is a computer-based stimulation method for modelling pollutant dispersion and air quality in the outdoor environment. Various numerical models are commercially available which may be used to investigate the location of ventilation intakes and exhausts. Such as those based on empirical methods and Computational Fluid Dynamics (CFD).

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. Please note there is a specific, unrelated, definition of ‘unoccupied’ with reference to acoustic testing and measurement and this should not be confused with the definition used here.

The following building areas, where relevant to the building type, can be excluded from the definition of occupied spaces for the potential for natural ventilation criteria:

1. Ancillary building areas, e.g. WCs, corridors, stairwells, store rooms, plant rooms
2. Swimming or hydrotherapy pools
3. Catering and small staff kitchens
4. Washrooms or changing areas
5. Laboratory or other areas where strictly controlled environmental conditions are a functional requirement of the space
6. Custody cells and holding areas in law courts
7. Operational, shop floors or ancillary areas in industrial buildings and retail buildings
8. Healthcare buildings: rooms or departments where control of ventilation is required for prevention of cross infection or controlled environmental conditions including:
   a. Operating theatres
   b. Laser surgery unit
   c. Operative imaging unit
   d. Intensive treatment unit
   e. Infectious diseases isolation unit
   f. Wards housing immuno-compromised patients
   g. Manufacturing pharmacy
   h. Specialised imaging, X-ray and scanning unit
   i. Pathology containment laboratories
   j. Mortuary and dissection suite
   k. Research laboratories and associated animal houses
   l. Sterilising and disinfecting unit (SDU)
   m. Emerging treatment technologies including gene therapy and stem cell units
   n. Areas immediately adjacent to the above are excluded if it can be demonstrated that reverse air flow would be likely with natural ventilation
   o. Any other areas which require mechanical ventilation to satisfy the requirements of healthcare Technical Memoranda
   p. Any other areas that require mechanical ventilation due to specific operational-related processes.

Occupied spaces requiring local exhaust ventilation, e.g. laboratories, workshops and food technology rooms, must still demonstrate that they meet the criteria for potential for natural ventilation (unless listed as an exempted area in this definition).

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).

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 LCI 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 (https://ec.europa.eu/growth/sectors/construction/eu-ki_en).

Relevant standards (ventilation)

Education buildings: Building Bulletin 101 Ventilation of School Buildings, April 2014. Offices spaces: Top of the range recommended in the British Council for Offices Guide to Best Practice in the Specification of Offices(74), i.e. 12 litres per second per person. Clinical areas with controlled environmental conditions: HTM 03-01 Specialised ventilation for healthcare premises(75) (England, Wales and Northern Ireland) SHTM 03-01 Ventilation for healthcare premises Part A: Design and Validation(76) (Scotland) Relevant standards are not listed for all areas or building types as the provision of fresh air is adequately covered in Approved Document Part F Ventilation (and the standards referenced therein).
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 and vehicle waiting bays
3. Other building exhausts, including from building services, plant, industrial or agricultural processes

Common pollutants discharged from these sources are covered by the UK Air Quality Strategy and include: benzene, 1,3-butadiene, carbon monoxide, lead, nitrogen dioxide, ozone, particles (PM10, PM2.5), polycyclic aromatic hydrocarbons and sulphur dioxide and those from all types of industrial processes covered by the Health and Safety Executive (HSE).

Service and access roads with restricted and infrequent access (for example roads used only for waste collection) are unlikely to represent a significant source of external pollution. These roads can therefore be excluded from the criteria of this issue. This does not include vehicle pick-up, drop-off or waiting bays.

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.

Wind tunnel modelling

Wind tunnel modelling is a versatile physical technique which allows a large number of variables (for example building design, intake and exhaust positions, local pollutant sources, wind speed and direction) to be investigated for complex urban areas. In particular, wind tunnel modelling provides reliable and detailed data, both visual and quantitative, on outdoor pollution distribution. This enables effective setting of intakes and exhausts for both mechanically and naturally ventilated buildings.

Additional information

Post construction Indoor air quality and measurement

The measurement of formaldehyde and TVOC must be made in accordance with the relevant standards (as listed in the criteria). ISO 16000-2(77) and ISO 16000-5 provide guidance on sampling strategies for formaldehyde and VOCs, respectively. Sampling should be performed in rooms that will be occupied for long periods of time such as bedrooms, living rooms, classrooms, offices, etc. A representative number of rooms should be sampled, rather than every room in the building. For example, in an office building, sampling of one cellular or single occupancy office should suffice to assess the indoor air quality for that type of habitable space in the building (assuming the other cellular offices have the same materials specification and ventilation strategy). In larger rooms, such as open-plan office areas, additional sampling locations may be required in order to understand the homogeneity of the indoor environment.

Uncertainties in sampling and analysis are inevitable and unavoidable, therefore it is recommended that replicate samples are taken at each sampling location (ideally a minimum of three samples for each measurement parameter). Before sampling, naturally ventilated rooms should be intensively ventilated for 15 minutes and then outer doors and windows closed for at least 8 hours (e.g. overnight) before sampling begins with the room still closed off. For mechanically ventilated rooms, the ventilation system should be running under standard operating
conditions for at least for 3 hours before sampling begins. Sampling locations should be at least 1 m to 2 m from a wall and at a height of between 1 m to 1.5 m.

This information 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 and not a compliance requirement. The sampling strategy should be determined based on the advice of the appropriate person appointed to conduct the testing.
Hea 03 Safe containment in laboratories

Aim

To recognise and encourage a healthy internal environment in laboratory areas through the safe containment and removal of pollutants.

Value

- Reduced health and safety risks to occupants within laboratories
- Managing the external discharge of pollutants and to minimise the associated health and wellbeing impacts
- Helping to create a comfortable and safe laboratory workspace

Context

Laboratory spaces are more hazardous and contain higher risks than average workplaces. It is therefore essential that the necessary measures are in place to ensure the health, safety and wellbeing of laboratory occupants and users. Due to the nature of work carried out in laboratory spaces, internal pollution is a key risk for building.
occupants which is normally best managed through the installation of appropriate building services solutions. Through the appropriate design and configuration of laboratory containment devices and flue or stack systems, the potential for hazardous concentrations of substances being released into the internal environment can be managed. Laboratories vary considerably in the type of pollution or contamination risks that they create and this often changes over time. As a result, carrying out an objective risk assessment allows the identification of potential hazardous, and enables the planning and implementation of the appropriate measures to control these risks and protect building users.

Assessment scope

<table>
<thead>
<tr>
<th>Applicable assessment criteria</th>
<th>Fully fitted</th>
<th>Simple building</th>
<th>Shell and core</th>
<th>Shell only</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assessment type specific notes</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>None</td>
</tr>
</tbody>
</table>
Hea 03 Safe containment in laboratories

Assessment criteria

This issue is split into two parts:

– Laboratory containment devices and containment areas (one credit)
– Fume dispersion and dilution (one credit - all building types except preschools, schools and sixth form colleges)

The following is required to demonstrate compliance for:

One credit - Laboratory containment devices and containment areas

1. An objective risk assessment of the proposed laboratory facilities has been carried out prior to completion of the Developed Design (RIBA Stage 3 or equivalent) (See Methodology below).

2. Where containment devices such as fume cupboards are specified their design, manufacture and installation meet best practice safety and performance requirements and objectives (See Methodology below).

3. Where containment level 1, 2, 3 and 4 laboratory facilities are specified they must meet the best practice safety and performance criteria and objectives (See Methodology below).

One credit - Fume dispersion and dilution

For all building types except preschool, schools and sixth form colleges

4. Modelling of the behaviour of the potentially contaminated plume released from laboratory stacks is performed (See Methodology below) to inform the design of flue and stack systems for the release of discharges from containment device exhausts.

Compliance notes

Compliance notes are located in Appendix G – Notes for compliance on page 18 for the consultation. These compliance notes will be available through the knowledge base when the scheme goes live.

Methodology

Risk assessment

The risk assessment must consider the proposed laboratory systems and should be carried out to ensure potential risks are considered in the design of the laboratory. The risk assessment must inform the selection of an appropriate performance band for containment devices that recognises both safety and sustainability objectives.

A method for conducting an objective based risk assessment is to use the Health and Safety Executive five step method of risk assessment and its issued policy template (www.hse.gov.uk).
Containment devices

The following standards, where appropriate, should be considered as part of the design, manufacture and installation of containment devices:

- General purpose fume cupboards
  - BS EN 14175-1:2003 Fume cupboards - Part 1: Vocabulary(78)
  - BS EN 14175-2:2003 Fume cupboards - Part 2: Safety and performance requirements79
  - BS EN 14175-3:2003 Fume cupboards - Part 4: On-site test methods(80)
  - DD CEN/TS 14175-5:2006 Fume cupboards - Part 5: Recommendations for installation and maintenance(81)
  - BS EN 14175-6:2006 Fume cupboards - Part 6: Variable air volume fume cupboards(82)
  - BS EN 14175-7:2012 Fume cupboards - Part 7: Fume cupboards for high heat and acidic load(83)
  - DIN 25466:2012 Fume hoods for radioactive materials - Rules for construction and tests(84)

Fume cupboard performance should be defined by Containment Factors or Protection Factors (as described in the BS EN 14175 series of standards) rather than face velocities.

- Recirculatory filtration fume cupboards
  - BS 7989:2001 Specification for recirculatory filtration fume cupboards(85)
- Microbiological safety cabinets
  - BS EN 12469:2000 Biotechnology - Performance criteria for microbiological safety cabinets(86)
  - BS 5726:2005 Microbiological safety cabinets - Information to be supplied by the purchaser to the vendor and in the installer, and siting and use of cabinets - Recommendations and guidance(87)
- Clean air hoods, glove boxes, isolators and mini-environments
  - BS EN ISO 14644-7:2004 Cleanrooms and associated controlled environments - Part 7: Separative devices (Clean air hoods, glove boxes, isolators and mini-environments)(88)
  - Guidelines for Gloveboxes, American Glovebox Society, 2007(89)
- Articulated exhaust arms
  - PD CEN/TR 16589:2013 Laboratory installations - Capture devices with articulated extract arm(90)
- Schools, sixth form colleges and further education with laboratories and fume cupboards for subjects up to and including A-level (or equivalent)
  - CLEAPSS (Consortium of Local Education Authorities for the Provision of Science Services) G9 Fume cupboards in Schools(91)

Containment level 1, 2, 3 and 4 laboratory facilities

The following standards, where appropriate, should be considered as part of the specification on containment level 1, 2, 3 and 4 laboratory facilities:

- BS EN 12128:1998 Biotechnology - Laboratories for research, development and analysis - containment levels of microbiology laboratories, areas of risk, localities and physical safety requirements(92)
- The management, design and operation of microbiological containment laboratories, Health and Safety Executive, 2001(93)
- The Genetically Modified Organisms (Contained Use) Regulations 2014 - Guidance on Regulations (L29), Health & Safety Executive, 2014(94)
- Biological agents: Managing the risks in laboratories and healthcare premises, Health & Safety Executive, 2005(95)
- Draft The Biological Agents and Genetically Modified Organisms (Contained Use) Regulations 2010 - Biosafety Guidelines, Health & Safety Executive, 2009(96)

Fume dispersion and dilution

An objective evaluation of the potential health or nuisance effects of the dispersion and dilution of fume from laboratories should be performed using a process such as:

1. Evaluate internal exhaust system dilution effects (through to the point of stack discharge).
2. Model the dilution or dispersion performance of the plume generated from the point of stack discharge.
3. Consider the concentrations of toxic or nuisance fume impacting receptor locations (ventilation intakes, opening windows, pedestrian areas, and public or private spaces).
4. Perform feedback iterations if the analysis suggests unacceptable conditions at any stage.

Appropriate levels of dilution from point of discharge to receptor locations for chemicals being used in containment devices need to be determined. A number of techniques are available with one example being described in: RWDI Technologies Issue No.17 - A dilution criterion for laboratory fume hood exhaust stacks, E Wong and J Alberico(97). Consideration should also be given to potential nuisance caused by fume discharges in accordance with the Environment Agency’s Additional guidance for H4 Odour Management- How to comply with your environmental permit, 2011(98).

Modelling of behaviour of the potentially contaminated plume released from laboratory stacks can be achieved by one of the following approaches:
- Calculation, e.g. ASHRAE Gaussian plume dispersion, dilution model (ASHRAE 1999 Fundamentals Handbook Chapter 15 and ASHRAE 2003 HVAC Applications Chapter 44
- Low-speed wind tunnel study
- Computational fluid dynamics carried out by a competent individual

Evidence

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Interim design stage</th>
<th>Final post construction stage</th>
</tr>
</thead>
<tbody>
<tr>
<td>All</td>
<td>One or more of the appropriate evidence types listed in The BREEAM evidential requirements on page 38 can be used to demonstrate compliance with these criteria.</td>
<td></td>
</tr>
</tbody>
</table>

Definitions

**Computational fluid dynamics competent individual**
An individual with one or more of the following qualifications and experience can be considered to be 'suitably qualified' for the purposes of carrying out computational fluid dynamics modelling:
- Holds a degree, PhD or equivalent qualification in, for example, a relevant engineering field (mechanical, chemical etc.), physics, mathematics, meteorology environmental sciences, environmental engineering or a related environmental discipline and membership of an appropriate professional body.
- Holds a degree, PhD or equivalent qualification in, for example, a relevant engineering field (mechanical, chemical etc.), physics, mathematics, meteorology environmental sciences, environmental engineering or a related environmental discipline and membership of an appropriate professional body.

**Fume cupboard or safety cabinet**
Scientific equipment designed to limit a person’s exposure to hazardous fumes or biological material. Air is drawn through the enclosure of the cupboard conducting the contaminated air away from the experimental area and those using the equipment.

**Laboratory**
A laboratory is an area of a building in which activities using potentially hazardous materials (chemical, biological, pathogenic, radioactive, physical) or processes requiring clean environments are undertaken in a combination of
primary containment (fume cupboards, microbiological safety cabinets, isolaters, other devices) and secondary containment (the envelope of the lab) using mechanical ventilation.

**Risk assessment**

For the purpose of the relevant laboratory criteria in this issue, a risk assessment is a systematic consideration of any activity in which there is a hazard, followed by decisions on the substances, equipment and procedures used and on the restrictions and precautions needed to make the risk acceptably low.

**Additional information**

BS EN 14175 Fume cupboard discharge velocity: Part 2 states that the discharge velocity from fume cupboard extracts should be at least 7m/s but that a figure of 10m/s is preferable to ensure that the discharge will not be trapped in the aerodynamic wake of the stack. Higher discharge velocities may be required, especially in windy locations, but higher rates may cause noise problems.
Hea 04 Thermal comfort

Aim

To ensure the building is capable of providing an appropriate level of thermal comfort.

Value

- Reduce the risk to occupier comfort, health and wellbeing from extreme or unacceptable winter and summer indoor temperatures.
- Provides future proofing of the building to maximise its ability to provide adequate thermal comfort for projected climate change scenarios.
- Reduces the impact on costs and the environment through wasted heat, or from the specification of complex and costly systems such as air-conditioning.

Context

Research has shown that extreme temperatures are associated with an increased risk of illness, and have an immediate effect on health and wellbeing. It is also recognised that measures taken to improve energy efficiency, such as increased air tightness, thermal insulation levels etc. have the potential to result in more instances of overheating in summer. With a changing climate, both under and overheating are an increasing problem in the
Effective temperature regulation is therefore an integral part of ensuring a healthy and comfortable internal environment. Achieving thermal comfort is dependent on the building being designed to allow for seasonal changes and occupier preferences. However it is also important to consider future temperatures which are expected throughout the lifetime of the building, so as to ensure future thermal comfort. The use of robust thermal modelling supports an energy efficient design while also ensuring environmental comfort in-use. Designing the building with thermal zones and controls ensures building user comfort by enabling a level of occupant control. Modelling with consideration of a range of projected climate change environment allows future-proofing of the building for projected climate conditions.

Assessment scope

<table>
<thead>
<tr>
<th></th>
<th>Fully fitted</th>
<th>Simple building</th>
<th>Shell and core</th>
<th>Shell only</th>
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<td>Applicable assessment criteria</td>
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<td>All</td>
<td>1–9</td>
<td>Not applicable</td>
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<tr>
<td>Assessment type specific notes</td>
<td>None</td>
<td>see ref 1.0</td>
<td>see ref 1.1 and 1.2</td>
<td>None</td>
</tr>
</tbody>
</table>

**Assessment type specific**

1.0 **Thermal Modelling** dynamic thermal modelling is not a requirement to achieve the credits but may be preferable as it can provide more accurate analysis results. Note that assessment criterion 2 already clarifies use of an alternative less complex means of modelling, which must be in accordance with CIBSE AM11.

1.1 **Thermal Modelling** thermal modelling assumptions 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 on the basis of a typical notional layout.

1.2 **Thermal Modelling** adaptability thermal model assumptions 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 on the basis of a typical notional layout.

**Building type specific**

2.0 **Industrial** this issue is not applicable to industrial units without office space and only an operational or storage area.
Hea 04 Thermal comfort

Assessment criteria

This issue is split into three parts:

– Thermal modelling (one credit)
– Design for future thermal comfort (one credit)
– Thermal zoning and controls (one credit)

One credit - Thermal modelling

1 Thermal modelling has been carried out using software in accordance with CIBSE AM11 Building Energy and Environmental Modelling.

2 The software used to carry out the simulation at the detailed design stage provides full dynamic thermal analysis. For smaller and more basic building designs with less complex heating or cooling systems, an alternative less complex means of analysis may be appropriate (such methodologies must still be in accordance with CIBSE AM11).

3 The modelling demonstrates that:

3.a. For air-conditioned buildings, summer and winter operative temperature ranges in occupied spaces are in accordance with the criteria set out in CIBSE Guide A Environmental Design, Table 1.5; or other appropriate industry standard (where this sets a higher or more appropriate requirement or level for the building type).

3.b. For naturally ventilated or free running buildings:

3.b.i. Winter operative temperature ranges in occupied spaces are in accordance with the criteria set out in CIBSE Guide A Environmental design, Table 1.5. Or other appropriate industry standard (where this sets a higher or more appropriate requirement or level for the building type).

3.b.ii. The building is designed to limit the risk of overheating, in accordance with the adaptive comfort methodology outlined in CIBSE TM52: The limits of thermal comfort: avoiding overheating in European buildings.

3.c. For multi-residential accommodation or supported living facilities:

3.c.i. Winter operative temperature ranges in occupied spaces are in accordance with the criteria set out in CIBSE Guide A Environmental design, Table 1.5. Or other appropriate industry standard (where this sets a higher or more appropriate requirement or level for the building type).

3.c.ii. The building is designed to limit the risk of overheating, in accordance with CIBSE TM59: Design methodology for the assessment of overheating risk in homes.

4 For air-conditioned buildings, the PMV (predicted mean vote) and PPD (predicted percentage of dissatisfied) indices based on the above modelling are reported via the BREEAM assessment scoring and reporting tool.

One credit - Design for future thermal comfort

5 Criteria 4 above to 4 are achieved.
6 The thermal modelling demonstrates that the relevant requirements set out in criterion 3 on the previous page are achieved for a projected climate change environment (see Definitions on page cxxi).

7 Where criterion 6 above is not met, the project team demonstrates how the building has been adapted, or designed to be easily adapted in future using passive design solutions in order to subsequently meet the requirements under criterion 6 above.

8 For air-conditioned buildings, the PMV and PPD indices based on the above modelling are reported via the BREEAM assessment scoring and reporting tool.

One credit - Thermal zoning and controls

9 Criteria 1 on the previous page to 4 on the previous page are achieved.

10 The thermal modelling analysis (criteria 1 on the previous page to 4 on the previous page) has informed the temperature control strategy for the building and its users.

11 The strategy for proposed heating or cooling systems demonstrates that it has addressed the following:

11.a Zones within the building, and how the building services could efficiently and appropriately heat or cool these areas. For example consider the different requirements for the central core of a building compared with the external perimeter adjacent to the windows.

11.b The degree of occupant control required for these zones. This is based on discussions with the end user (or alternatively building type or use specific design guidance, case studies, feedback) and considers:

11.b.i User knowledge of building services
11.b.ii Occupancy type, patterns and room functions (and therefore appropriate level of control required)
11.b.iii How the user is likely to operate or interact with the systems, e.g. are they likely to open windows, access thermostatic radiator valves (TRV) on radiators, change air-conditioning settings etc.
11.b.iv The user expectations (this may differ in the summer and winter) and degree of individual control (i.e. obtaining the balance between occupant preferences, for example some occupants like fresh air and others dislike draughts).
11.b.v How the proposed systems will interact with each other (where there is more than one system) and how this may affect the thermal comfort of the building occupants.
11.b.vi The need or otherwise for an accessible building user actuated manual override for any automatic systems.

Compliance notes

Compliance notes

Compliance notes are located in Appendix G – Notes for compliance on page 18 for the consultation. These compliance notes will be available through the knowledge base when the scheme goes live.
Thermal comfort strategies

Thermal comfort strategy- occupancy patterns
Where the number of building occupants is unknown, e.g. speculative developments (or shell and core), the default occupancy rates given in CIBSE Guide A can be used to determine a default number of users. Where the typical use patterns are also unknown: Tra01 Public transport accessibility 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.

Thermal comfort strategy - occupant control
In education and prison building types, occupant control is meant for staff use only.

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 11.a and criteria 11.b on the previous page.

Compliance can be demonstrated where zoning allows separate occupant control (within the occupied space) of each perimeter area (i.e. within 7m of each external wall) and the central zone (i.e. over 7m from the external walls). 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.

The distance requirement for smaller buildings is approximate; however, the assessor must use sound judgment considering 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(103).

Evidence

<table>
<thead>
<tr>
<th>Criteria</th>
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<tbody>
<tr>
<td>All</td>
<td>One or more of the appropriate evidence types listed in The BREEAM evidential requirements on page 38 can be used to demonstrate compliance with these criteria.</td>
<td>Refer to generic evidence requirement above</td>
</tr>
<tr>
<td>10, 11, 12</td>
<td>Thermal comfort study</td>
<td>Refer to generic evidence requirement above</td>
</tr>
</tbody>
</table>
Definitions

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

Clinical areas
Areas of the building in which medical functions are carried out that require specific restricted environmental conditions such as humidity, daylighting, temperature, etc. (e.g. X-ray, operating department, delivery room, etc.).

Free running buildings
- Time period: 2050s
- Emissions scenario: Medium (A1B)

Mechanically ventilated or mixed mode buildings
- Time period: 2030s
- Emissions scenario: Medium (A1B).

The above weather files represent the minimum requirements to perform thermal modelling under a climate change scenario and subsequently 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 indicated above have been selected to represent the building services life cycle likely to be present in each building services strategy type. A shorter time period is chosen for mechanically ventilated or mixed mode building types due to consideration of mechanical servicing equipment life span (before major upgrade or replacement is required), and to avoid over-specification of plant which could lead to inefficient operation.

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. Please note there is a specific, unrelated, definition of ‘unoccupied’ with reference to acoustic testing and measurement and this should not be confused with the definition used here. 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.

Patient areas
Areas of the building used mainly by inpatients (e.g. wards, dayrooms, etc.).

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.

**Projected climate change environment**

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 Test Reference Years (TRYs) and Design Summer Years (DSYs) provided by CBSE. This weather data enables thermal analysis of building designs under current climatic conditions, yet no account is taken of the projected variations in weather data that will occur during the building's life cycle as a result of climate change. The following probabilistic DSY weather data files should be used to establish the projected climate change environment against which the design is evaluated:

**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 British Standard BS EN ISO 7730:2005: Ergonomics of the thermal environment. Analytical determination and interpretation of thermal comfort[104], thermal comfort is defined using the calculation of PMV and PPD indices and local thermal comfort criteria. It is also defined as ‘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 in order to establish what makes people feel comfortable. HSE considers 80% of occupants as a reasonable limit for the minimum number of people who should be thermally comfortable in an environment. 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 the majority of building occupants.

**Thermal dynamic analysis**

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

CIBSE Guide A and BS EN ISO 7730:2005
The assessment criteria for this issue require compliance with the operative room temperature ranges set out in CIBSE Guide A, Table 1.5. This table includes recommended summer and winter comfort criteria (temperature ranges) for a number of specific building applications.

The operative room temperature ranges provided in CIBSE Guide A have been derived in accordance with the heat balance model for thermal comfort (PMV and PPD) as detailed in BS EN ISO 7730.

The CIBSE Guide A operative temperature ranges correspond to a PMV of ±0.25 which sits between the Category A and Category B requirements listed in Annex A, Table A.1 of EN ISO 7730. Compliance with the CIBSE Guide A criteria will therefore effectively also demonstrate compliance with the Category B requirements set out in EN ISO 7730.

Healthcare building types
The appropriate industry standard for healthcare is Health Technical Memorandum 03-01 Specialised ventilation for healthcare premises\(^{105}\). Thermal comfort levels in patient and clinical areas must be in accordance with the temperature ranges set out in HTM 03-01, Appendix 2. Furthermore, internal summer temperatures must not exceed 28°C dry bulb for more than 50 hours per year (as defined in HTM 03-01, paragraph 2.15). Other occupied spaces not covered in HTM 03-01 Appendix 2 should be in accordance with CIBSE Guide A Environmental Design.

Education building types (Schools only)
An appropriate industry standard for schools is Building Bulletin 101, Ventilation of school buildings (April 2014) \(^{106}\). For schools with a straightforward servicing strategy, ClassCool is considered a suitable alternative to an AM11 full dynamic model.

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. CIBSE Guide A (Table 1.5) includes recommended summer and winter comfort.

Projected climate change weather data
A range of alternative probabilistic weather files produced in accordance with the UK climate impacts programme (UKCP) 2009 projections have been produced to be compatible with simulation software packages. These weather files provide the opportunity to evaluate the impact of varying climate change scenarios building design performance throughout its life cycle. Projected climate change weather files are currently available in TRYs and DSYs and according to three projected time periods; 2030s, 2050s and 2080s, and for each period, two ‘emissions scenarios’ are available; Medium Emissions (A1B) and High Emissions (A1F1).

The PROMETHEUS project at Exeter University has produced a number of future weather files specific to different locations across the UK, created using the UKCP09 weather generator. Weather files produced under the PROMETHEUS project are available at empsexeter.ac.uk.
Hea 05 Acoustic performance

Aim

To ensure the building is capable of providing an appropriate acoustic environment to provide comfort for building users.

Value

- Minimises disturbances to building occupants from noise transition between spaces
- Enhances productivity by providing appropriate acoustic environment for the different functions of various buildings and spaces.

Context

Noise within buildings can come various sources, including building systems, occupants, equipment and external sources. Excessive noise can have a range of adverse effects on building users including inconvenience and
annoyance, loss of concentration, decreased productivity and sleep disturbance. Therefore, the management of noise within a building is important to maximise occupant comfort, occupant efficiency to provide privacy. As a result, building acoustics are an important consideration in the design, operation and construction of buildings. Building acoustics should allow rooms to be used as intended, without compromising sound sensitive spaces or activities. Designing to building type specific acoustic performance standards for sound insulation, indoor ambient noise levels and reverberation times, supports acoustic comfort for building occupants.

### Assessment scope

<table>
<thead>
<tr>
<th></th>
<th>Fully fitted</th>
<th>Simple building</th>
<th>Shell and core</th>
<th>Shell only</th>
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</thead>
<tbody>
<tr>
<td>Applicable assessment criteria</td>
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<td>Criterion 3 for multi-residential see ref 1.0</td>
<td>Criterion 3 for multi-residential see ref 1.0</td>
</tr>
</tbody>
</table>

### Assessment type specific

#### 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 build 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.

### Building type specific

<p>| | |</p>
<table>
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<tbody>
<tr>
<td>None</td>
<td>None</td>
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</table>
Hea 05 Acoustic performance

Assessment criteria

This issue is split into two parts:

- Acoustic performance (up to three credits for all building types, except Multi-residential which has four credits available)
- Acoustic performance for Multi-residential (Up to four credits for Multi-residential only)

The following is required to demonstrate compliance:

**Up to three credits - Acoustic performance**

For all building except Multi-residential, which has four credits available below.

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. Reverberation times.
   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 Hea 05 Acoustic performance: Criterion 1 above, setting out the performance requirements for each and the testing regime required.

<table>
<thead>
<tr>
<th>Table 23 BREEAM acoustic criteria for education buildings</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Education buildings (three credits)</strong></td>
</tr>
<tr>
<td><strong>First credit - Sound insulation</strong></td>
</tr>
<tr>
<td>Criteria</td>
</tr>
<tr>
<td>Testing requirement</td>
</tr>
</tbody>
</table>

| **Second credit - Internal indoor ambient noise levels** |
| Criteria | Achieve the indoor ambient noise levels set out within Section 1 of BB93 for all room types. |
| Testing requirement | A programme of acoustic measurements is carried out by a compliant test body in accordance with the ANC Good Practice Guide, Acoustic testing of Schools. |

| Notes | For heavy weight roofs, or parts of the roof that are heavyweight, with a mass per unit area greater than 150kg/m² (including those with sedum planting) that do not have any glazing or rooflights, calculations are not required, as such the credit can be awarded on a default basis of compliance. |
### Education buildings (three credits)

#### Third credit - Reverberation

| 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 acoustic measurements 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 acoustic measurements 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 design intent implemented within the STI model. Where significant changes or differences are observed, the SQA shall re-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 24 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 HTM08-01: Acoustics, 2013 (109) determined according to the privacy requirements using both Table 3 and Table 4 from HTM08-01: Acoustics. The weighted standardised impact sound pressure level (L'nT,w) must not exceed 65dB for floors over noise-sensitive rooms, following the guidance in HTM08-01: Acoustics. For assessments in Scotland, see also Country specific guidance on page cxliii. |

#### 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 HTM08-01: Acoustics. For assessments in Scotland, see also Country specific guidance on page cxliii. |

#### Second credits - Internal indoor ambient noise levels

| Criteria | The indoor ambient noise requirements for noise intrusion from external sources in Table 1 of HTM08-01: Acoustics, 2013 are not exceeded. The values for internal noise from mechanical and electrical services in Table 2 of HTM08-01: Acoustics are not exceeded. For assessments in Scotland, see also Country specific guidance on page cxliii. |

#### Testing requirement

| A programme of acoustic measurements is carried out by a compliant test body in accordance with the Section 7 of HTM08-01 Acoustics. For assessments in Scotland, see also Country specific guidance on page cxliii. |

#### Third credit - Reverberation

| Criteria | Acoustic environment (Control of reverberation and sound absorption): Achieve the requirements relating to sound absorption set out in Section 2 of HTM08-01: Acoustics. For assessments in Scotland, see also Country specific guidance on. |
### Healthcare buildings (three credits)

| Testing Requirement | Installation of a specification compliant with the HTM08-01 criteria demonstrates compliance. A site inspection by the developer or SQA is required to confirm that a compliant specification has been installed. |

### Table 25 BREEAM acoustic criteria for Office buildings

#### Office buildings (three credits)

<table>
<thead>
<tr>
<th>First credit - Sound insulation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Criteria</strong></td>
</tr>
<tr>
<td><strong>Testing requirement</strong></td>
</tr>
<tr>
<td><strong>Notes</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Second credit - Internal indoor ambient noise levels</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Criteria</strong></td>
</tr>
<tr>
<td><strong>Testing requirement</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Third credit - Reverberation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Criteria</strong></td>
</tr>
<tr>
<td><strong>Testing Requirement</strong></td>
</tr>
</tbody>
</table>

### Table 26 BREEAM acoustic criteria for law court buildings

#### Law court buildings (three credits)

<table>
<thead>
<tr>
<th>First credit - Sound insulation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Criteria</strong></td>
</tr>
<tr>
<td><strong>Testing requirement</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Second credit - Internal indoor ambient noise levels</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Criteria</strong></td>
</tr>
<tr>
<td><strong>Testing requirement</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Third credit - Reverberation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Criteria</strong></td>
</tr>
</tbody>
</table>
Law court buildings (three credits)

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Achieve the requirements relating to sound absorption and reverberation times, where applicable, set out in Section 28 of the CSDG. For assessments in Scotland, see also Country specific guidance on page ciii.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Testing requirement</td>
<td>A programme of acoustic measurements is carried out by a compliant test body in accordance with Section 28 of the CSDG and ‘Calculation Procedures’ where applicable. For assessments in Scotland, see also Country specific guidance on page ciii.</td>
</tr>
</tbody>
</table>

Table 27 BREEAM acoustic criteria for Industrial, Retail, Prisons and Other building types

<table>
<thead>
<tr>
<th>Industrial, Retail, Prisons and Other building types (two credits)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>First credit – Sound insulation</strong></td>
</tr>
<tr>
<td>All room functions</td>
</tr>
<tr>
<td>Criteria</td>
</tr>
<tr>
<td>Testing requirement</td>
</tr>
<tr>
<td>Rooms with specific functions</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Second credit – Internal indoor ambient noise levels</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Criteria</td>
</tr>
<tr>
<td>Testing requirement</td>
</tr>
<tr>
<td>Rooms with specific functions</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Third credit – Acoustic environment (control of reverberation and sound absorption)</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Criteria</td>
</tr>
<tr>
<td>Testing requirement</td>
</tr>
<tr>
<td>Rooms with specific functions</td>
</tr>
</tbody>
</table>

Up to four credits - Acoustic performance for Multi-residential

Where criterion 1 on page cxxxvi has been met.

Table 28 BREEAM acoustic criteria for Multi-residential buildings

<table>
<thead>
<tr>
<th>Multi-residential (Up to four credits)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>First &amp; second credit - Sound insulation</strong></td>
</tr>
<tr>
<td>Criteria</td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>
Multi-residential (Up to four credits)

| Testing requirement | Airborne sound insulation values are at least 5dB higher and impact sound insulation values are at least 5dB lower than the performance standards in the relevant building regulations or standards. |

| Third credit- internal 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 complainant test body in accordance with the acoustic testing and measurement procedures outlined in Methodology below. |

| Fourth credit- Acoustic environment (control of reverberation and sound absorption) |
| Criteria | Achieve the requirements relating to sound absorption 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. |

Compliance notes

Compliance notes are located in Appendix G – Notes for compliance on page 18 for the consultation. These compliance notes will be available through the knowledge base when the scheme goes live.

Methodology

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 1628331123, 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. For measurements of reverberation time, the relevant principles of BS EN ISO 354:20031133 should be used and the guidance provided in BS EN ISO 140–7:19981143 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 facade) 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 referenced document, 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 shall be conducted in rooms utilising each strategy. Otherwise, measurements shall be made in rooms on the noisiest façade.
6. T in LAeq, 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, LAeq 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.

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, for example in small healthcare facilities. Where this is the case, clear reasoning must be provided by the compliant test body prior to awarding the credits.

Multi-residential and other residential institutions

Multi-residential 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 28 on page cxxxvi. 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 and acoustic environment, as set out in the criteria for Table 27 on page cxxxvi for ‘other buildings’ as well as the self-contained dwellings or rooms for residential purposes. Only include occupied spaces (as defined in BREEAM issue Hea 01 Visual comfort) covered by the Other buildings criteria in the calculation for the percentage of ‘non-residential’ floor area.

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.
Evidence

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Interim design stage</th>
<th>Final post construction stage</th>
</tr>
</thead>
<tbody>
<tr>
<td>All</td>
<td>One or more of the appropriate evidence types listed in The BREEAM evidential requirements on page 38 can be used to demonstrate compliance with these criteria.</td>
<td></td>
</tr>
</tbody>
</table>

Definitions

**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), 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 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) 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 300mm 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 environmental 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. Please note that for this issue, there is a specific, unrelated, definition of ‘unoccupied’ with reference to acoustic testing and measurement.
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. An individual who holds a recognised acoustic qualification and membership of an appropriate professional body. The primary professional body for acoustics in the UK is the Institute of Acoustics.

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 sound 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

Law Court buildings

The CSDG, HMCS, 2010 has been withdrawn and has not been replaced. However, CSDG is still considered to represent best practice standards and should be applied. Alternative equivalent standards can be used where necessary provided justification is given.

Country specific guidance

The following standards or building regulations etc. are relevant for the assessment of the issue:

England


Northern Ireland

For multi-residential 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 HTM08-01, assessments in Scotland should use SHTM08-01(116).

For Law Courts buildings, where the criteria refer to the use of Section 28 of CSDG, HMCS, 2010-assessments in Scotland should refer to ETS-01 Courtroom technology and spatial requirements design guide 2011(117) and ETS-03 Estates technical standard environmental performance, design guide 2011(118).

For multi-residential assessments, where the criteria refer to the performance standards in building regulations, in Scotland, this is referring to Technical Handbook 2016- Domestic: Section 5. Noise.

Wales
For multi-residential 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 $L_{\text{Aeq,T}}$ 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, $L_{\text{Aeq,T}}$ can be estimated from the NR value using the following formula: $L_{\text{Aeq,T}} = \text{NR} + 6$ 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 $L_{\text{Aeq,T}}$ can still be determined from the NR value for the building services noise. The $L_{\text{Aeq,T}}$ for the external noise transmitted via the façade must then be combined with the $L_{\text{Aeq,T}}$ for the building services.
**Hea 06 Security**

**Aim**

To encourage the planning and implementation of effective measures that provide an appropriate level of security to the building and site.

**Value**

- Encourages the development and implementation of security measures specific to the project
- Improves the understanding of security risks to enable more considered specification of additional measures
- Reduces the risk of crime relating to both people and property
- Improves the health and wellbeing of the occupiers by limiting stress from the fear of crime.

**Context**

Feelings of safety and security are essential to successful, sustainable communities. Freedom from crime and the fear of crime has a major impact on quality of life, and therefore effects the wellbeing and productivity of building.
occupants.

Security risks are dependent on the context of a building and, as a result, need to be specifically determined based on a number of variables including function and location. In addition to this, security risks are not static and can change over time. Therefore consultation with the appropriate professionals is essential in determining the necessary security measures for any development.

Through consultation with a Suitably Qualified Security Specialist (SQSS), site-specific recommendations can be made to improve the security of the site. This creates a safer and more secure environment that reduces the fear of and risk of crime. This supports the physical and mental wellbeing of building users, and the protection of property and business.

Assessment scope

<table>
<thead>
<tr>
<th>Applicable assessment criteria</th>
<th>Fully fitted</th>
<th>Simple building</th>
<th>Shell and core</th>
<th>Shell only</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assessment type specific notes</td>
<td>None</td>
<td>None</td>
<td>see ref 1.0</td>
<td>see ref 1.0</td>
</tr>
</tbody>
</table>

Assessment type specific

1.0 Speculative project - if the SQSS is unable to make complete recommendations due to the speculative nature of the assessment, then the credit may still be available. The SQSS must confirm that they have addressed all parts of the project where it is feasible to do so, based on the information available to them at the time of assessment. In relation to the influence of the occupiers on security, the SQSS shall clearly document their assumptions in the SNA.

Building type specific

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 and storage and visitor or staff parking. Security relating to secure prison buildings and their related site layout falls outside of the scope of BREEAM.
Hea 06 Security

Assessment criteria

This issue has one part:

– Security of site and building (one credit)

The following is required to demonstrate compliance for:

One credit - Security of site and building

1. A Suitably Qualified Security Specialist (SQSS) conducts an evidence based Security Needs Assessment (SNA) during or prior to Concept Design (RIBA Stage 2 or equivalent). The purpose of the SNA will be to identify attributes of the proposal, site and surroundings which may influence the approach to security for the development.

2. The SQSS develops a set of security controls for incorporation into the proposals. Those controls shall directly relate to the threats and assets identified in the preceding SNA.

3. The recommendations shall be incorporated into proposals and implemented in the as-built development. Any deviation from those recommendations shall be justified and agreed with the SQSS.

Exemplary level criteria

To achieve an exemplary performance credit:

4. A compliant risk based security rating scheme has been used. The performance against the scheme has been confirmed by independent assessment and verification.

Compliance notes

Compliance notes are located in Appendix G – Notes for compliance on page 18 for the consultation. These compliance notes will be available through the knowledge base when the scheme goes live.

Methodology

Timing of consultation

Where an SQSS was consulted at a later stage than RIBA stage 2, 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 have not been restricted, 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).

Scope of security controls

The scope of the recommended security controls may consider the following:
– Design and layout (e.g. crime prevention through environmental design)
– Physical security (e.g. tested and certified security products)
– Technological security (e.g. automatic access control systems, CCTV)

Evidence

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Interim design stage</th>
<th>Final post-construction stage</th>
</tr>
</thead>
<tbody>
<tr>
<td>All</td>
<td>One or more of the appropriate evidence types listed in The BREEAM evidential requirements on page 38 can be used to demonstrate compliance with these criteria.</td>
<td></td>
</tr>
</tbody>
</table>

Definitions

Architectural Liaison Officer (ALO)

An ALO is the same as the Crime Prevention Design Advisor and is the title given to the same role in some police forces. [www.securedbydesign.com](http://www.securedbydesign.com)

Counter Terrorism Security Advisor (CTSA)

CTSA’s receive specialist training allowing them to identify and assess sites within their police force area that are deemed critical and may be vulnerable to terrorist or extremist attack. They then devise appropriate security plans to minimise impact on that site and the surrounding community. They also have responsibility for the protection afforded to crowded places (areas which by virtue of their crowd density may be liable to terrorist attack).

Crime Prevention Design Advisor (CPDA)

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

In most cases it is likely that an assessment carried out in accordance with the relevant Secured by Design (SBD) design guides (relevant to the building or development type) will cover the items listed above. Wherever possible, duplication should be avoided and so where existing schemes such as SBD cover the required information there would be no need for a separate report to be created specifically for the purpose of the BREEAM assessment. In all instances the assessor should review the evidence supplied, and ensure that the points listed have been covered.

Dedicated cycle lanes

Marked-out and clearly signed routes to accommodate building users arriving on and travelling through the assessed site on a bicycle. Cycle lanes should be fit for purpose and the following publications offer guidance on how to appropriately size, design and construct cycle lanes:
1. Local Transport Note 2/08 Cycle Infrastructure Design, Department of Transport, 2008.

**Dedicated pedestrian crossing**

Dedicated infrastructure or road markings and signage or instructions that enables a pedestrian to safely cross a vehicle carriageway on the assessed site and continue their journey to or from the building. Such a crossing must be fit for purpose, in that it will be appropriate for the width of the road, level of traffic and pedestrian use specific to the site. It will also act to alert drivers of vehicles using the carriageway to the potential presence of pedestrians in the carriageway, by ensuring they can be clearly seen and requiring the driver of the vehicle to give way to the pedestrian.

**External site areas**

Areas external to the assessed building, but within the development’s site boundary, which contain vehicle or pedestrian access roads and pathways to the building, parking, unloading and drop-off areas.

**Peer review**

A process employed by a professional body to demonstrate that potential or current full members maintain a standard of knowledge and experience required to ensure compliance with a code of conduct and professional ethics.

**SABRE**

SABRE is a security assessment and certification scheme for buildings and built infrastructure assets. The scheme provides facility owners, occupiers and interested parties with:

1. an independently assessed security risk management rating for a facility (SABRE Assurance Rating); and
2. the ability to measure, compare and evaluate the security performance of a facility against a range of credible security threats.

SABRE has a star based rating system, with ratings subject to certain minimum criteria and the achievement of issues. The scheme offers:

- Recognition of good practice
- A credible security label for buildings & infrastructure
- Demand for secure buildings
- Quantifiable reduction in security risks
- Better informed security investment decisions
- Improved value for money

**Secured by Design (SBD)**

SBD is a crime prevention initiative operated by the police services of the United Kingdom, which aims to utilise design principles and products in the built environment that reduce the risk of crime by combining minimum standards of physical security and proven principles of natural surveillance and defensible space. SBD is administered by Police Crime Prevention Initiatives (PCPI) which is owned by the London Mayor’s Office for Policing Crime Prevention Initiatives (MOPAC) on behalf of the UK police service, and has the support of the National Police Chiefs Council and Police Scotland.

**Security needs assessment (SNA)**

The project and site-specific assessment of security needs, including:

1. A visual audit of the site and surroundings, identifying environmental cues and features pertinent to the security of the proposed development.
2. Formal consultation with relevant stakeholders, including the local ALO, CPDA and CTSA (as applicable), in order to obtain a summary of crime and disorder issues in the immediate vicinity of the proposed development.
3. Identify risks specific to the proposed, likely or potential use of the buildings.
4. Identify risks specific to the proposed, likely or potential user groups of the buildings.
5. Identify any detrimental effects the development may have on the existing community.

The purpose of the assessment is to inform stakeholder decision-making and allow the identification and evaluation of security recommendations and solutions.

The Safer Parking Scheme

An initiative of the Association of Chief Police Officers aimed at reducing crime and the fear of crime in parking facilities. Safer parking status, Park Mark®, is awarded to parking facilities that have met the criteria of a risk assessment conducted by the Police. The scheme is managed by the British Parking Association (BPA) and supported by the Home Office and Scottish Executive.

Suitably qualified security specialist (SQSS)

An individual achieving 1–3 or 4 of the following can be considered to be suitably qualified for the purposes of compliance with BREEAM:

1. Minimum of three years experience in a relevant security profession (in the last five years). This experience must clearly demonstrate a practical understanding of factors affecting security in relation to construction and the built environment, relevant to the type and scale of the project being undertaken.
2. Holds a qualification relevant to security.
3. Maintains a full membership to a relevant professional body, institute or certification scheme that has a professional code of conduct, to which member adhere.
4. A specialist registered with a BREEAM recognised third party licensing or registration scheme for security specialists.

Suitable security rating system

A security assessment method for buildings, led by an independent assessor, which grades security performance against a defined standard at design, shell and core and post construction stages. Through certification the system shall recognise and reward:

- Adoption of industry best practice, tools and standards,
- A systematic and risk based approach to security,
- An appropriate and proportionate response to security needs,
- Innovation in security risk assessment,
- Engagement of competent persons for the process of identifying security needs, security planning, design and the implementation of security controls.

An SQSS may be any practising security professional (e.g. a private security consultant or advisor, an ALO, CPDA, CTSA, or an individual associated with the client team), however they must demonstrate they hold the experience, qualifications and memberships required by the SQSS criteria. When appointing the SQSS, consideration should be given to the appropriateness of the individual to carry out the task assigned. The SQSS should be able to demonstrate they have experience dealing with similar projects with equal security levels and similar risks.

The following are currently recognised as a third party licensing or registration scheme for an SQSS

SABRE

Any licensing or registration scheme for security specialists that wishes to apply to be recognised by BREEAM should contact BRE Global.
Additional information

The following is a list of existing schemes that may support the SQSS when developing the recommendations or solutions addressing the issues raised in the SNA (criteria 1 and 2 on page cxlvii):  
- Secured by Design, Design Guides (relevant to the building or development type)  
- Safer Parking Scheme*  
- SABRE  

*The Safer Parking Scheme is only applicable to schemes where the primary function of the site is for parking of vehicles, or to parking areas serving the prevailing site uses.

Useful references

The Metric Handbook\(^{(119)}\) contains details of typical delivery or freight vehicle sizes and turning circles.  
In addition to the SBD Schools guidance, Managing School Facilities, Guide 4 Improving Security in Schools, published by the Department for Education and Employment (1996)\(^{(120)}\), offers guidance on how to improve the security of school premises.
Hea 07 Safe and healthy surroundings

Aim

To encourage the provision of safe access around the site and outdoor space that enhances the wellbeing of building users.

Value

- Ensures safe access to and safe movement around the site
- Facilitates the activities that can have physical, mental and social benefits for occupants aiding staff retention.
- Adds to the desirability of the building helping to increase its value and appeal to occupants and neighbours

Context

The external environment of a building plays an important role in the health and wellbeing of building users, and the overall appeal of the building. Safe access to the building, and safe movement around the site are important
considerations to ensure the health, safety and general wellbeing of the building and site users.

The provision of green recreational space provides numerous benefits to building occupants, and the building’s value. It brings an element of biophilia to a building by supporting human interaction with the natural environment. Further to this, green recreational space can promote healthy lifestyles by promoting exercise and reducing stress levels. As a result it is increasingly acknowledged within Corporate Social Responsibility. Government policy also recognises the benefits of green recreational space to the health and wellbeing of people, but also the indirect benefits such as alleviating flood risk. Furthermore the health benefits of recreational space are beginning to be recognised by organisations such as the NHS. Including such a space in development increases the desirability of the building, thus improving its value.

**Assessment scope**

<table>
<thead>
<tr>
<th></th>
<th>Fully fitted</th>
<th>Simple building</th>
<th>Shell and core</th>
<th>Shell only</th>
</tr>
</thead>
<tbody>
<tr>
<td>Applicable assessment criteria</td>
<td>All</td>
<td>All</td>
<td>All</td>
<td>All</td>
</tr>
<tr>
<td>Assessment type specific notes</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>None</td>
</tr>
</tbody>
</table>

**Assessment type specific**

None

**Building type specific**

None
Hea 07 Safe and healthy surroundings

Assessment criteria

This issue is split into two parts:

– Safe access (one credit)
– Outside space (one credit)

One credit - Safe access

Where external site areas form part of the assessed development the following apply:

1 Dedicated and safe cycle paths are provided from the site entrance to any cycle storage, and connect to off-site cycle paths where applicable.

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, and
   2.d: Connecting to off-site paths where applicable.

3 Pedestrian drop off areas are designed off of, or adjoining to, the access road and should provide direct access to other footpaths.

Where vehicle delivery access and drop-off areas form part of the assessed development, the following apply:

4 Delivery areas are not accessed through general parking areas and do not cross or share the following:
   4.a: pedestrian and cyclist paths
   4.b: outside amenity areas accessible to building users and 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.

Compliance notes

Compliance notes are located in Appendix G – Notes for compliance on page 18 for the consultation. These compliance notes will be available through the knowledge base when the scheme goes live.
Methodology

None.

Evidence

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Interim design stage</th>
<th>Final post-construction stage</th>
</tr>
</thead>
<tbody>
<tr>
<td>All</td>
<td>One or more of the appropriate evidence types listed in The BREEAM evidential requirements on page 38 can be used to demonstrate compliance with these criteria.</td>
<td></td>
</tr>
</tbody>
</table>

Definitions

**Dedicated and safe cycle lanes**
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. Adequate external lighting in accordance with BS 5489-1:2013 Lighting of roads and public amenity areas.
2. Appropriate sized, designed and constructed. The following publications offer guidance on how to demonstrate this:
   a. Local Transport Note 2/08 Cycle Infrastructure Design, Department of Transport, 2008.

**Dedicated and safe foot paths**
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. Adequate external lighting in accordance with BS 5489-1:2013 Lighting of roads and public amenity areas.

**Dedicated pedestrian crossing**
Dedicated infrastructure or road markings and signage or instructions that enables a pedestrian to safely cross a vehicle carriageway on the assessed site and continue their journey to or from the building. Such a crossing must be fit for purpose, in that it will be appropriate for the width of the road, level of traffic and pedestrian use specific to the site. It will also act to alert drivers of vehicles using the carriageway to the potential presence of
pedestrians in the carriageway, by ensuring they can be clearly seen and requiring the driver of the vehicle to give way to the pedestrian.

**External site areas**

Areas external to the assessed building, but within the development’s site boundary, which contain vehicle or pedestrian access roads and pathways to the building, parking, unloading and drop-off areas.

**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:

– be an outdoor landscaped area, for example a garden, balcony or terrace. The majority of the space should be open to the sky,
– have appropriate seating areas and be non-smoking,
– be located to ensure it is accessible to all building users and avoids areas that will have disturbances from sources of noise (e.g. building services, car parks, busy roads, delivery areas, etc.).

**Additional information**

**Applicability of issue**

The safe access criteria apply only to developments that have areas external to the assessed building and within the boundary of the assessed development (regardless or not of whether that external area is or will be the responsibility of the future building occupant). This includes external parking areas. If the assessed building does not have any external areas and access to the building is direct from the public highway or footpath, then the criteria concerning safe access are not applicable and the credit can be awarded by default.

Where the assessed building has no external areas but does have a covered parking facility, and cyclists/ pedestrians/ delivery vehicles access the building via this area, then the relevant safe access criteria apply and this area must be assessed against those criteria.

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.

Criteria 4 on page cliv and 5 on page cliv (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 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, this criteria and criteria 7 on page cliv are not applicable.

The outdoor space criteria apply to all assessments. Where it is not possible to provide outdoor space, due to statutory requirements, or other issues outside of the control of the developer, then this criterion will be filtered out.

Where both the safe access and outside space criteria are deemed not applicable to the project (in accordance with the above, the issue will be filtered out.)
Useful references
The Metric Handbook\(^{(1,22)}\) contains details of typical delivery or freight vehicle sizes and turning circles.
Energy

Summary
This category encourages the specification and design of energy efficient building solutions, systems and equipment that support the sustainable use and management of energy during 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.

Ene 01 Reduction of energy use and carbon emissions standards 13 credits

- Encourage the design of energy efficient buildings with energy performance above national building regulations.
- Encourage the accurate modelling of operational energy consumption.

Ene 02 Energy monitoring min standards 2 credits

- Measure accurately the energy consumption of the building by end use, to help identify and reduce high energy demands where possible.

Ene 03 External lighting 1 credit

- Reduce the building’s energy consumption through the specification of energy efficient external lighting.

Ene 04 Low carbon design 3 credits

- Reduce the building’s energy consumption through the adoption of passive design solutions, free cooling and low or zero carbon (LZC) energy sources.

Ene 05 Energy efficient cold storage 2 credits

- Reduce the building’s operational greenhouse gas emissions (CO₂ eq.) through the design, installation and commissioning of energy efficient refrigeration systems.

Ene 06 Energy efficient transport systems 3 credits

- Reduce the building’s energy consumption by specifying the optimum number and size of energy efficient transport systems.

Ene 07 Energy efficient laboratory systems 5 credits

- Reduce the building’s operational greenhouse gas emissions (CO₂ eq.) by specifying best practice energy efficient laboratory equipment.

Ene 08 Energy efficient equipment 2 credits

- Demonstrate a meaningful reduction in the total unregulated energy demand of the building by using energy efficient equipment.
Ene 01 Reduction of energy use and carbon emissions

Fully fitted
Simple building
Shell & core
Shell only
Minimum standards

Aim

To minimise operational energy demand, primary energy consumption and CO₂ emissions.

Value

- Reduce operational energy consumption and associated carbon emissions
- Promote energy performance beyond regulatory requirements including recognition of net zero carbon solutions in line with WGBC policy
- Encourage consideration of operational aspects in determining optimal energy strategy
- Provides a route to verification of building performance post occupation
- Help in reducing the performance gap between predicted and actual performance

Context

Emissions from buildings account for 37% of total UK greenhouse gas emissions. These are made up of 45% direct emissions due to the burning of fossil fuels for heat, and 55% indirect emissions related to electricity use (123). Factors such as the thermal insulation, air permeability, shading and glazing areas should be carefully considered early as they can be used to reduce heating, cooling and lighting demands. Systems efficiency and carbon intensity of the selected energy source are also important and all are included in the BREEAM assessment.
Detailed and accurate energy modelling can take into account factors like occupancy, weather scenarios and management of building services as well as any contributions from renewable and low carbon technologies. More detailed modelling helps the design teams predict the expected energy performance and take appropriate actions to reduce the performance gap where they are involved post occupation. Actual usage patterns are changing over time and it is possible that predicted energy consumption will not be that close to the actual energy consumption. However, with the use of accurate modelling any areas of difference can be identified and appropriate actions can be taken to optimise energy performance.

**Assessment scope**

<table>
<thead>
<tr>
<th>Applicable assessment criteria</th>
<th>Fully fitted</th>
<th>Simple building</th>
<th>Shell and core</th>
<th>Shell only</th>
</tr>
</thead>
<tbody>
<tr>
<td>Applicable assessment criteria</td>
<td>All</td>
<td>All</td>
<td>All</td>
<td>1</td>
</tr>
<tr>
<td>Assessment notes</td>
<td>None</td>
<td>See ref. 1.0 (for criteria 2–5 only)</td>
<td>See ref. 1.1 and 1.2</td>
<td>See ref. 1.3</td>
</tr>
</tbody>
</table>

**Assessment type specific**

1.0 Depending on the building type, the assessor should use their discretion to define the best approach to undertake additional energy modelling for generating predicted energy consumption targets by end use.

1.1 For the energy modelling, if the building services efficiencies and performance specifications are not known (i.e. they are not within the remit of the shell and core developer and will be provided as part of the fit-out works), services complying with the minimum energy efficiency standards or backstop levels required by the relevant national building regulations should be used.

1.2 For the energy modelling, the design team can use the performance specifications confirmed within a green fit-out agreement that is contractually required from the tenants in their fit-out works. This rule applies only to those areas of the building that the scope of the green fit-out agreement covers. Speculative areas of the assessed building not fitted out or covered by the scope of such an agreement must follow the note 1.1.

1.3 Calculate an Energy Performance Ratio just for the building's heating and cooling energy demand only (EPR<sub>ED</sub>). Compare the EPR<sub>ED</sub> achieved with the EPR<sub>NC</sub> benchmark scale and award the corresponding number of BREEAM credits.

**Building type specific**

None
Up to nine credits - Energy performance

1 Calculate an Energy Performance Ratio for New Constructions (EPRNC). Compare the EPRNC achieved with the benchmarks in Table 29 below and award the corresponding number of BREEAM credits.

Table 29 Ene 01 EPRNC benchmark scale

<table>
<thead>
<tr>
<th>BREEAM credits</th>
<th>EPRNC</th>
<th>Rating</th>
<th>Minimum requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0.1</td>
<td></td>
<td>Requires a performance improvement progressively better than the relevant national building regulations compliant standard (see Energy performance on the next page).</td>
</tr>
<tr>
<td>2</td>
<td>0.2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>0.3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>0.4</td>
<td>Excellent</td>
<td>Requires 4 credits to be achieved (equivalent to an EPR of at least 0.4).</td>
</tr>
<tr>
<td>5</td>
<td>0.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>0.6</td>
<td>Outstanding</td>
<td>Requires 6 credits to be achieved (equivalent to an EPR of at least 0.6).</td>
</tr>
<tr>
<td>7</td>
<td>0.7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>0.8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>0.9 AND zero net regulated CO₂ emissions*</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Zero net regulated CO₂ emissions are only required to achieve the maximum number of credits (9). There is no additional CO₂ minimum requirement for any BREEAM rating.

A description of how the EPRNC is calculated from a building’s modelled operational energy performance, primary energy consumption and CO₂ emissions is provided in Energy performance on the next page.

Four credits - Prediction of operational energy consumption

Prerequisite

2 Achieve Man 01 Project brief and design: Criterion 5 on page xlvii for the design team to hold a preliminary design workshop focusing on the design for operational energy performance.

Four credits – Energy modelling and reporting

3 Undertake additional energy modelling during the design and post construction stage to generate predicted operational energy consumption figures (see Prediction of operational energy consumption on page clxv).

4 Report predicted energy consumption targets by end use, design assumptions and input data (with justifications).

5 Carry out a risk assessment to highlight any significant design, technical, and process risks that should be monitored and managed throughout the construction and commissioning process.
Exemplary level criteria

Up to two credits - Beyond zero net regulated carbon
6 The building achieves an EPR$_{NC}$ of 0.9 and zero net regulated CO$_2$ emissions (see Definitions on page clxii).
7 Energy generation from on-site and near-site LZC sources is sufficient to offset carbon emissions from regulated energy use plus a percentage of emissions from unregulated energy use.
8 Award the exemplary credits based on the percentage of additional emissions from unregulated energy that are offset by LZC sources (see Table 30 below).

Three credits - Carbon negative
9 The building is deemed carbon negative where $>100\%$ (see Table 30 below) of carbon emissions from unregulated (and regulated) energy use are offset by energy generated from on-site and near-site LZC sources (see Definitions on page clxii).

<table>
<thead>
<tr>
<th>Exemplary performance credits</th>
<th>Equivalent % criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>10%</td>
</tr>
<tr>
<td>2</td>
<td>50%</td>
</tr>
<tr>
<td>3</td>
<td>$&gt;100%$</td>
</tr>
</tbody>
</table>

Two credits – Verification stage
10 Achieve two credits in Ene 02 Energy monitoring on page clxiii.
11 The client commits to the verification stage and to report on the actual energy consumption compared with the targets set in criterion 4 on the previous page.
12 The energy modelling (criterion 3 on the previous page) is:
   12.a Submitted to BRE and
   12.b Retained by the building owner.

Compliance notes
Compliance notes are located in Appendix G – Notes for compliance on page 18 for the consultation. These compliance notes will be available through the knowledge base when the scheme goes live.

Methodology

Energy performance
The methodology for the EPR$_{NC}$ calculation considers three metrics of modelled building performance when determining the number of credits achieved for this issue. The three metrics are:
1. The building’s heating and cooling energy demand
2. The building’s primary energy consumption
3. The total resulting CO$_2$ emissions.

These three metrics for the actual modelled building performance are compared against the relevant national building regulations compliant standard (i.e. a baseline) and each is expressed as a percentage improvement. The percentage improvements are then compared against modelled building stock and translated into a ratio of
performance for each metric. These ratios are then weighted for each metric and added together to determine the overall Energy Performance Ratio (EPR NC).

The calculation is determined using the following performance data from annual energy modelling of the building's specified or designed regulated fixed building services and fabric, as undertaken by an accredited energy assessor using approved building energy calculation software:

1. Building floor area (m²)
2. Notional building heating and cooling energy demand (mJ/m²)
3. Actual building heating and cooling energy demand (mJ/m²)
4. Notional building primary energy consumption (kWh/m²)
5. Actual building primary energy consumption (kWh/m²)
6. Target Emission Rate (TER) (kg CO₂/m²)
7. Building Emission Rate (BER) (kg CO₂/m²).

The necessary energy modelling data required to determine building performance is sourced from National Calculation Method compliant energy modelling software, used by the design team to demonstrate building regulation compliance. This data are then entered into the BREEAM Ene 01 calculator to determine the EPR NC and number of credits achieved. The Ene 01 calculator is within the BREEAM assessment scoring and reporting tool, in the Assessment issue scoring tab, Energy section.

The four countries of the UK have their own building regulations for energy and while they use the same methodology and approved calculation software, each have different definitions of the notional building and set different requirements for regulatory compliance, i.e. baseline performance. This is accounted for in the BREEAM NC 2018 Ene 01 methodology through the 'translator curves' defined for each country. Therefore, the EPR NC and the BREEAM credits are determined by comparing the assessed buildings modelled operational energy performance relative to the regulatory baseline for the country in which the building is located.

The following lists the building regulations used to define each country's BREEAM 'translator curve' to benchmark building energy performance relative to a regulatory baseline and award credits.

**Scotland**

**Northern Ireland**
Technical Booklet F2 2012 Conservation of fuel and power in buildings other than dwellings.

**England**

**Wales**

The relevant building regulations for Scotland are the Technical Handbook 2016 Non-Domestic, Section 6 Energy.

The relevant building regulations for Northern Ireland are the Technical Booklet F2 2012 Conservation of fuel and power in buildings other than dwellings.


The methodology is described in greater detail in Guidance Note provided on the BREEAM website.

**Building regulations classifications for multi-residential buildings**

Multi-residential buildings that can be assessed under BREEAM UK New Construction 2018 will be classified under either the non-dwelling version of the relevant building regulations or a combination of the non-dwelling and dwelling of the building regulations. For England, Wales and Northern Ireland, areas classified under their relevant
building regulations documents, Approved Documents (AD) Part L2A and the NI Technical Handbook F2, are classed as 'buildings other than dwellings'. However this does also include 'rooms for residential purposes' (see below). Areas classified as Part L1A or Technical Handbook F1 are 'self-contained dwellings'. The Part L/Technical Handbook F classification impacts this BREEAM issue in that areas classified as Part L2A/F2 must be assessed using SBEM and areas classified as Part L1A/F1 must be assessed using SAP. For Scotland, see the General section and Appendix A of the Technical Handbook Non-Domestic for definitions of domestic and non-domestic buildings.

For Wales, areas classified under the relevant building regulations documents, Approved Documents (AD) Part L2A, are classed as 'buildings other than dwellings'. However this does also include 'rooms for residential purposes' (see below). Areas classified as Part L1A are 'self-contained dwellings'. The Part L classification impacts this BREEAM issue in that areas classified as Part L2A must be assessed using SBEM and areas classified as Part L1A must be assessed using SAP.

For Northern Ireland, areas classified under their relevant building regulations documents, the Technical Booklet F2, are classed as 'buildings other than dwellings'. However this does also include 'rooms for residential purposes' (see below). Areas classified as Technical Booklet F1 are 'self-contained dwellings'. The Technical Booklet F classification impacts this BREEAM issue in that areas classified as Part F2 must be assessed using SBEM and areas classified as Part F1 must be assessed using SAP.

For England, areas classified under the relevant building regulations documents, Approved Documents (AD) Part L2A, are classed as 'buildings other than dwellings'. However this does also include 'rooms for residential purposes' (see below). Areas classified as Part L1A are 'self-contained dwellings'. The Part L classification impacts this BREEAM issue in that areas classified as Part L2A must be assessed using SBEM and areas classified as Part L1A must be assessed using SAP.

**Room for residential purposes**
The building regulations for Wales, Northern Ireland and England give the following definition:

Room for residential purposes means a room, or 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 and includes a room in a hostel, a hotel, a boarding house, a hall of residence or a residential home but does not include a room in a hospital, or other similar establishment, used for patient accommodation.

**Guidance for assessing Ene 01 performance in buildings that contain residential areas**

**Guidance for assessing performance where the building has been modelled using SAP only**
The relevant data must be sourced from the SAP data sheet from the approved software (provided by the Accredited energy assessor). This data must first be entered in to the 'Ene 01 Supplementary Calculator for Multi-Residential Buildings Using SAP'. The calculator converts the data into the outputs outlined in Energy performance on page clxii. Once converted by the Ene 01 Supplementary Calculator, the outputs should be entered into BREEAM's Ene 01 Calculator in the BREEAM Assessment Scoring and Reporting tool. This calculator will then confirm the Energy Performance Ratio (EPR NC) and number of BREEAM credits achieved.

The Ene 01 Supplementary Calculator for Multi-Residential Buildings Using SAP describes in detail what data to source from the SAP data sheets.

**Guidance for assessing performance where the building has been modelled using SAP and SBEM**
Where the building has been classified under both the non-dwelling and the dwelling regulations, because it contains both residential and non-residential areas, two sets of energy performance data will be required: one set from SBEM for the non-domestic areas; and one from SAP for the self-contained dwellings.

The relevant SAP data must first be entered into the 'Ene 01 Supplementary Calculator for Multi-Residential Buildings Using SAP'. This calculator converts the data into the outputs outlined in Energy performance on page clxii. This converted SAP data along with the relevant outputs from SBEM must then be added to BREEAM's Ene 01 Calculator in the BREEAM Assessment Scoring and Reporting Tool. This calculator will then confirm the Energy Performance Ratio (EPR NC) and number of BREEAM credits achieved.
Where both SBEM and SAP outputs are used, the total credits achieved are determined by area weighting the credits achieved for the domestic and non-domestic parts of the building. The area weighted totals are then added together and rounded down to the nearest whole credit. The same method of area weighting is applied to the percentage improvement on the building’s Target Emission Rate. The area weighted credits and percentage improvement are the totals used to determine compliance with BREEAM’s Ene 01 minimum standards.

Guidance for assessing performance where the building has new build and refurbished areas

As part of the bespoke criteria development for Ene 01 issue, we allow the new-build to be assessed against the New Construction scheme and the refurbishment against the Refurbishment and Fit-out scheme. The tool performs an area-weighted average score.

Renewable and low carbon installations

Any low or zero carbon technologies installed in the assessed building can be used to offset emissions arising from regulated and, in the case of exemplary credits, unregulated energy consumption. The LZC technology can be installed on-site or near site where a private wire arrangement is in place (see Definitions on page clxii).

Extensions to existing buildings

If assessing a new extension to an existing building, the energy modelling must be based on the building fabric of the new extension and the building services plant installed that will service the new extension (either existing or new).

The energy modelling does not have to consider the existing building fabric where this will not form part of the scope of the BREEAM assessment. Nor does it have to consider existing building services where they are not supplying services (heating, cooling or ventilation) to the new extension being assessed.

Building assessed as part of a larger development

If the assessed building is part of a larger development and there are existing or new LZC sources which serve other buildings, then the amount of LZC energy generation should be allocated to buildings based on their energy consumption. However, LZC energy generation from existing LZC sources that has already been allocated to show compliance with buildings regulations must be excluded from consideration to avoid double counting.

Prediction of operational energy consumption

The Energy Prediction and Verification Guidance defines a methodology to use for design stage energy modelling and subsequent in-use validation in order to obtain the Ene 01 credits. The aim of the methodology is to incentivise better understanding of energy modelling techniques and reward more accurate predictions of energy use at early stages to support better design and construction of new buildings.

The energy modeller must model several scenarios creating a range of predicted consumptions, informed by a risk assessment of the building energy uses.

These scenarios will consider:

- Weather
- Operating hours for systems
- Occupancy hours
- Management factors

The intention is to provide consistency with existing industry standard guidance where possible. Wherever appropriate, the BREEAM methodology refers to existing documents for compatibility with current industry standard methodologies. For more information please refer to the ‘Energy Prediction and Verification’ document provided on the BREEAM website.
Estimating unregulated energy demand for building systems or processes

At present there is no standard or national calculation methodology for modelling unregulated energy demands in a building. To demonstrate compliance with the ‘exemplary level criteria’ the building’s modelled operational ‘regulated’ energy consumption may be used as a proxy for its unregulated energy demand, i.e. unregulated energy equals 100% of regulated energy. While not accurate, this approach enables BREEAM to assess and award credits for buildings that meet a proportion of its unregulated energy demand via on-site or near-site renewable energy sources. Where unregulated energy demand for the building can be accurately predicted, then this data can be used to determine the percentage of unregulated energy demand met via renewable energy sources.

Unregulated energy demand can be estimated on the basis of metered data from a similar or the same building type with the same unregulated system or process loads or by using the methodology described in CIBSE TMS4: 2013, ‘Evaluating Operational Energy Performance of Buildings at the Design Stage, 2013’ [124]. Where additional energy modelling has been carried out (criterion 3 on page clxvi), the output of this modelling should be used to estimate the unregulated energy demand.

Verification stage

Where the exemplary credits are achieved and the verification stage will be followed, the building owner will need to:

- report energy consumption for the first 12 months of normal occupancy for all relevant end uses
- report energy consumption for the first 12 months, broken down into monthly intervals, for all relevant end uses (see Man 05 Aftercare on page lxxii)
- compare reported energy consumption figures with targets set in criterion 4 on page clxii
- identify causes of discrepancies and the remediation actions required.

More information on the Verification stage is provided in Scope of the BREEAM UK New Construction 2018 scheme version on page 25.

Evidence

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Interim design stage</th>
<th>Final post-construction stage</th>
</tr>
</thead>
<tbody>
<tr>
<td>2–12</td>
<td>One or more of the appropriate evidence types listed in The BREEAM evidential requirements on page 38 can be used to demonstrate compliance with these criteria.</td>
<td>As per interim design stage.</td>
</tr>
<tr>
<td>1</td>
<td>A copy of the building regulations output document from the approved software. The output documents must be based on the design stage of analysis. A copy of the building regulations output document from the design stage SAP calculations (where relevant for multi-residential buildings).</td>
<td>As per interim design stage, but with the output documents from the approved software reflecting performance at the as-built stage of analysis. This must account for any changes to the specification during construction and the measured air leakage rate, ductwork leakage and fan performances (as required by building regulations).</td>
</tr>
<tr>
<td>2</td>
<td>Workshop minutes, agreed outcomes.</td>
<td>As per interim design stage.</td>
</tr>
<tr>
<td>3–5</td>
<td>Predicted energy consumption values, design assumptions, input data and risk assessments reported as detailed in the ‘Energy Prediction and Verification’ document. Confirmation of energy modeller’s qualifications and experience.</td>
<td>As per interim design stage. Where changes to design assumptions and input data have occurred at post-construction stage, the energy modelling should be re-run to take into account those changes.</td>
</tr>
<tr>
<td>6–9</td>
<td>As above, plus evidence confirming:</td>
<td>As required above and as per interim</td>
</tr>
</tbody>
</table>
Criteria | Interim design stage | Final post-construction stage
--- | --- | ---
1. The total carbon neutral energy generation (kWh/yr) | design stage. | 
2. The source of the carbon neutral energy | | 
3. Calculated estimate of energy consumption from unregulated systems or process (kWh/yr) (only required if confirming zero regulated carbon or carbon negative exemplary credits) | | 
4. Calculated estimate of exported energy surplus (only required if confirming carbon negative status). | | 

10–12 The client’s commitment to proceed to the verification stage and report the energy consumption. | As per interim design stage. | 

Definitions

**Accredited energy assessor**
A person registered with an accredited energy assessment scheme provider. The scheme provider will be licensed by the relevant government department to accredit competent persons in the energy assessment of non-domestic or domestic buildings for the purposes of demonstrating compliance with the building regulations in the country of origin. The energy assessor should be appropriately accredited for the building being assessed. For a full list of approved accreditation schemes or organisations for energy assessors and links to registers of accredited energy assessors visit: www.ndepregister.com (non-domestic), www.epcregister.com (domestic) www.scotland.gov.uk/epbniregisternd.com (non-domestic), www.epbniregister.com (domestic)

2. Scotland: www.gov.scot

Only individuals that appear on the DCLG register for England and Wales, the Department of Finance register for Northern Ireland and the Scottish Government register are qualified as accredited energy assessors.

**Approved building energy calculation software**
Software approved for the purpose of demonstrating compliance with the energy efficiency and carbon emission requirements of the building regulations (and in turn compliance with the EPBD recast 2012). The definition includes the SBEM and its interface iSBEM, as well as third-party software approved by the relevant government department. A list of approved software for non-domestic buildings for Wales is provided here: www.ncm.bre.co.uk

A list of approved software for non-domestic buildings for Scotland is provided here: www.scotland.gov.uk
A list of approved software for non-domestic buildings for Northern Ireland is provided here: www.ncm.bre.co.uk/
A list of approved software for non-domestic buildings for England is provided here: www.ncm.bre.co.uk
A list of approved software for non-domestic buildings is as follows:

1. Scotland: www.gov.scot
2. Wales, Northern Ireland and England: www.ncm.bre.co.uk/

Approved building energy calculation software will provide the data required for calculating the EPR, and BREEAM Ene 01 credits. Please note that for dwellings (where relevant to the assessment of multi-residential buildings), the government’s SAP may be used. The current version is SAP 2012 version 9.92 (October 2013).

Backstop levels
Backstop levels are identified as minimum energy efficiencies in the guidance to the standards on building services in Section 6 of the Technical Handbook for Scotland.

Building Emission Rate (BER)
The building CO₂ emission rate expressed as carbon dioxide emissions per square metre per year (kg CO₂/m²/year). The BER is calculated in accordance with the National Calculation Methodology (NCM) and the Simplified Buildings Energy Model (SBEM).

Building regulations
Building regulations set standards for the design and construction of buildings to ensure the safety and health of people in or about those buildings. They also include requirements to ensure that fuel and power is conserved and facilities are provided for people, including those with disabilities, to access and move around inside buildings. In Scotland, they also aim to secure the welfare and convenience of persons in or about buildings and to further the achievement of sustainable development. See Energy performance on page clxxi for details of the relevant documents for each country.

Carbon negative building
A building or site that generates, surplus to its own energy demand, an excess of renewable or carbon neutral energy and exports that surplus via the national grid to meet other, off-site energy demands, i.e. the building is a net exporter of zero carbon energy. Surplus in this respect means the building or site generates more energy via renewable or carbon neutral sources that it needs to meet its own regulated and unregulated energy needs. Any surplus must be exported through the national grid. This definition of carbon negative focuses only on energy and carbon dioxide emissions resulting from the operational stage of the building life cycle (as this is the stated aim of this assessment issue). It does not take into account the embodied carbon, in terms of carbon fixing or emissions resulting from the manufacture or disposal of building materials and components (these impacts or benefits are dealt with in Mat 01 Environmental impacts from construction products - Building life cycle assessment on page 287).

Carbon neutral
Carbon neutral means that, through a transparent process of calculating building operational emissions, reducing those emissions and offsetting residual emissions, net carbon emissions equal zero. This includes carbon emissions from both regulated and unregulated energy consuming plant and systems.

Controlled service or fitting
The building regulations for England (125) define this as a service or fitting in relation to which the building regulations imposes a requirement.
The building regulations for energy performance of buildings define this as a service or fitting in relation to which the building regulations imposes a requirement.

**Dwelling Emission Rate (DER)**

The DER is the estimated carbon dioxide emissions per square metre per year (kg CO₂/yr) for the dwelling as designed. It accounts for energy used in heating, fixed cooling, hot water and lighting. It is the equivalent of the BER for dwellings.

**Dynamic simulation model (DSM)**

A software tool that models energy inputs and outputs for different types of buildings over time. In certain situations, SBEM will not be sophisticated enough to provide an accurate assessment of a building’s energy efficiency. In these cases government-approved proprietary dynamic simulation models may be used.

**Energy demand**

The building energy provided for end uses in the building such as space heating, hot water, space cooling, lighting, fan power and pump power. Energy demands are the same as room loads. One of the outputs from the building regulations output document is for heating and cooling energy demand only, not for any other building energy uses. Heating and cooling energy demands are influenced by factors including building fabric heat loss, air permeability, glazing and shading.

**Energy Performance Ratio for New Constructions (EPR NC)**

A metric that is unique to BREEAM and calculated by the BREEAM Ene 01 Calculator within the BREEAM Assessment Scoring and Reporting tool, using modelled outputs from the approved building energy calculation software. It is a ratio that defines the performance of a BREEAM-assessed building in terms of its regulated operational heating and cooling energy demand, primary energy consumption and CO₂ emissions. This measure of performance is used to determine the number of Ene 01 credits a building achieves in the BREEAM assessment.

A description of how the EPR NC is defined and calculated is summarised in Energy performance on page cxi and outlined in greater detail in Guidance Note 12.

**Fixed building service**

The building regulations for energy performance of buildings define this as any part of, or any controls associated with:

1. Fixed internal or external lighting systems but does not include emergency escape lighting or specialist process lighting; or
2. Fixed systems for heating, hot water service, air-conditioning or mechanical ventilation.

**Green fit-out agreement**

A formal contractually binding agreement between a building developer or owner and their tenants. As such, a green fit-out agreement (or ‘green’ clauses or sections in a lease agreement) can be used as evidence demonstrating compliance with the relevant BREEAM issue criteria at the interim design and final post-construction stages of assessment. The agreement should make specific reference to the specification requirements or levels claimed, and as defined by BREEAM in this technical manual, where credits are awarded. BREEAM aims to encourage a mutually beneficial relationship between the shell and core developer or owner of a building and its future tenants so that the fully fitted operational building achieves performance against the highest possible environmental standards. In order to achieve this, BREEAM encourages and rewards the use of formal legally binding green fit-out agreements between a developer or owner and their tenant. Where a legally
binding green fit-out agreement is provided as evidence and it commits the tenant’s fit-out to meet the criteria of this BREEAM issue, credits are available to be awarded.

Minimum energy efficiency standards
Minimum energy efficiency standards are the minimum acceptable values for each type of service required by the building regulations for Wales, Northern Ireland and England, as set out in the Non-Domestic Building Services Compliance Guide. They are called ‘minimum acceptable standards’ in the Technical Booklet F2 for Northern Ireland. They are called ‘Limiting services efficiencies’ in Part L2A for England.

Low or zero carbon (LZC) technologies
A low or zero carbon technology provides a source of energy generation from renewable energy sources or from a low carbon source such as combined heat and power (CHP) or ground source heat pumps (GSHP).

National Calculation Method (NCM)
The NCM enables quantification of building operational energy consumption and CO₂ emissions resulting from regulated building services, systems and fabric performance. The NCM is the methodology used for demonstrating compliance with the European Union Energy Performance of Buildings Directive (EPBD) 2012 (recast). Building energy modelling compliant with the NCM can be carried out using approved software. The full details are described in the NCM Modelling Guide for the relevant country:


Use whichever building regulations are relevant for the assessed building

The full details are described in the 2013 Wales NCM Modelling Guide, www.2013ncm.bre.co.uk.
The full details are described in the National Calculation Methodology (NCM) Modelling Guide for Scotland (2010), www.gov.scot
The full details are described in the NCM Modelling Guide (2010) [128], www.ncm.bre.co.uk
The full details are described in the NCM Modelling Guide (2013), www.ncm.bre.co.uk

Near-site LZC
A LZC source of energy generation located near to the site of the assessed building. The source is most likely to be providing energy for all or part of a local community of buildings, including the assessed building, e.g. decentralised energy generation linked to a community heat network or renewable electricity sources connected via a private wire arrangement.

Notional building
A hypothetical building of the same size, shape, orientation and shading as the actual building, with the same activities, zoning and system types and exposed to the same weather data, but with pre-defined specified properties for the building fabric, fittings and services. The notional building is concurrent with the national building regulations for Wales 2014, Northern Ireland 2012 and England 2013. For Scotland 2013, the ‘notional’ building is generated based upon a building designed to meet the 2002 standards and a percentage improvement is applied to define the compliant building target carbon dioxide emission rate (TER).

On-site LZC
A LZC source of energy generation which is located on the same site as the assessed building.
Primary energy
Energy from fossil fuel and renewable sources that has not undergone any conversion or transformation process.

Primary energy consumption
This measures the primary energy content of delivered fuel or other energy sources. It takes account of the energy associated with fuel production, energy transformation (e.g., electricity generation) and distribution processes, including losses, in addition to the inherent energy content of the fuel or energy source.

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

Regulated energy
Building energy consumption resulting from the specification of a controlled, fixed building services and fittings, including space heating and cooling, hot water, ventilation and lighting.

Standard Assessment Procedure (SAP) for Energy Rating of Dwellings
The government’s approved methodology for assessing the energy performance of new dwellings. The current version is SAP 2012 version 9.92. The procedure accounts for energy used in:
- Space heating and cooling
- Hot water
- Fixed lighting
- Mechanical ventilation

The Simplified Building Energy Model (SBEM)
SBEM is software developed for DCLG by BRE. SBEM is a computer program that provides an analysis of a building’s energy consumption. It calculates monthly energy use and carbon dioxide emissions of a building (excluding dwellings) based on a description of the building geometry, construction, use and HVAC and lighting equipment. SBEM is accompanied by a basic user interface, iSBEM. There also exists alternative approved software ‘front-end’ interfaces for SBEM.

Target Emission Rate (TER)
The target emission rate is the minimum energy performance requirement (required by building regulations) for a new non-domestic building (kgCO₂/yr). The TER is calculated in accordance with NCM and SBEM. For dwellings, the TER is calculated using the SAP methodology according to the requirements defined in the building regulations for dwellings. The TER is expressed in terms of the mass of CO₂ emitted per year per square metre of total useful floor area of the building (kgCO₂/yr).

Unregulated energy
Building energy consumption resulting from a system or process that is not ‘controlled’, i.e. energy consumption from systems in the building on which the Building Regulations do not impose a requirement. For example, this may include energy consumption from systems integral to the building and its operation, e.g. lifts, escalators,
refrigeration systems and ducted fume cupboards; or energy consumption from operational-related equipment, e.g. computers, servers, printers, photocopiers, laptops, mobile fume cupboards, cooking, audio-visual equipment and other appliances.

**Zero net regulated carbon emissions**

The annual building net regulated CO₂ emissions (kg CO₂/yr) arising as a result of annual energy consumption from fixed building services and of requirements imposed on such systems by the building regulations. Fixed building services include space heating and cooling, domestic hot water, ventilation and lighting systems, also referred to as controlled services and fittings. The building energy modelling can take account of contributions of energy generated from on-site and near-site renewable and low carbon installations when aiming to achieve a zero regulated carbon status. Energy generated and supplied from off-site renewable and low carbon installations cannot be used to meet this definition.

**Additional information**

None.
Ene 02 Energy monitoring

Aim

To encourage the installation of energy sub-metering that facilitates the monitoring of operational energy consumption. To enable managers and consultants post-handover to compare actual performance with targets in order to inform ongoing management and help in reducing the performance gap.

Value

- Allows managers and occupants to monitor operational energy consumption by fuel and by end-use categories to identify poor performance and changes in consumption patterns
- Allows owners, managers and occupiers to take steps to minimise the performance gap between predicted and actual energy consumption
- Allows the management of energy costs and identification of areas of inefficient operation, system deficiencies and building management issues
- Allows comparison between the performance of new and existing building properties

Context

‘You can’t manage what you do not measure’ - Through detailed energy metering and monitoring, owners and facilities managers are able to understand how their building is performing in greater detail and take steps to
improve deficiencies. Poor energy monitoring and management is the biggest single contributor to higher than expected energy use in operational buildings and can present major opportunities to reduce energy consumption. Appropriate actions such as changing practices and procedures, cutting wastage and managing energy use can reduce operating costs, energy consumption and carbon emissions. Appropriate strategies for metering can also ensure the building owner is better informed of the usage figures for the building to optimise energy supply contracts and renegotiate new ones(129) as well as managing facilities management contractors and comparing performance across a property portfolio.

### Assessment scope

<table>
<thead>
<tr>
<th>Applicable assessment criteria</th>
<th>Fully fitted</th>
<th>Simple building</th>
<th>Shell and core</th>
<th>Shell only</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assessment type specific notes</td>
<td>None</td>
<td>See ref. 1.0</td>
<td>See ref. 1.1 (for criteria 4 and 5 only)</td>
<td>None</td>
</tr>
</tbody>
</table>

The first credit is applicable to all building types. The second credit is not applicable to preschools, primary schools, law courts, prisons and multi-residential buildings.

### Assessment type specific

1.0 Depending on the building type, the assessor should use their discretion to identify which end-use categories (where present) should be sub-metered.

1.1 **Sub-metering of high energy load and tenancy areas credit**
Criteria 4 and 5 on page clxxvii
Meters must be installed on the energy supply to each separate tenanted unit or floor plate within the assessed development.

### Building type specific

2.0 **Buildings situated on campus developments**
Criteria 4 and 5 on page clxxvii
The systems 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, for monitoring energy consumption. The criteria only apply to the assessed building. Where energy services are supplied from an existing building on the campus, they shall be metered by fuel at the entry points to the assessed building. Provision of a pulsed or other open protocol communication output is not sufficient to award the credit for these building types.

2.1 **Small tenanted office, industrial or retail units**
Criteria 4 and 5 on page clxxvii
A single meter per unit for electricity and another for heating is sufficient to achieve this credit. Individual areas within each unit do not need to be sub-metered. For the purpose of this BREEAM issue, a small unit is defined as less than 200m².

2.2 **Large office, industrial or retail units**
Criteria 4 and 5 on page clxxvii
For a development consisting of one or more larger units (i.e. greater than 200m²), sufficient sub-metering to allow for monitoring of the relevant function areas or departments within the unit must be specified, in addition to metering of the unit as a whole.

2.3 **Healthcare**
Criteria 4 and 5 on page clxxvii
Large-scale medical equipment or systems can be excluded (although it is recommended that sub-metering is considered in such instances).

2.4 **Multi-residential accommodation or residential institutions**
An electric heating system can be combined with lighting and small power, as long as sub-metering is provided for each floor plate or other appropriate sub-division.

### 2.5 Self-contained dwellings with individual utility meters
If self-contained dwellings covered by the assessment have their own individual energy supply and utility meter (e.g. gas or electricity), this supply can be excluded from the scope of this issue. All shared energy supplies and communal areas are still included in the assessment. 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. However, the lighting and small power comes from a shared distribution board on each floor, in which case this shared supply will need to be sub-metered in accordance with the criteria.

### 2.6 Office buildings relevant function areas or departments
Criteria 4.a.i and 4.b.ii on page clxxvi.
1. Office areas (metering by floor plate)
2. Catering

### 2.7 Retail buildings relevant function areas or department
Criteria 4.a.i and 4.b.ii on page clxxvi.
1. Sales area
2. Storage and warehouse
3. Cold storage
4. Offices
5. Catering
6. Tenant units

### 2.8 Industrial units relevant function areas or departments
Criteria 4.a.i and 4.b.ii on page clxxvi.
1. Office areas
2. Operational area
3. Ancillary areas (e.g. canteens etc.)

### 2.9 Hotel buildings relevant function areas or departments
Criteria 4.a.i and 4.b.ii on page clxxvi.
1. Office areas
2. Catering (e.g. kitchen, restaurant)
3. Conference suites
4. Swimming pool or leisure facilities
5. Hotel bedrooms metered per floor, core, floor plate in a strategy that would provide a benefit to the facilities management.

It is acceptable for the electric heating system to be combined with lighting and small power for metering purposes, as long as sub-metering is provided for each floor, core or floor plate. The benefit to the facilities management can be measured by carrying out a comparison with similar building areas where it would be possible to identify any unusual or excessive energy consumption.

### 2.10 Education buildings relevant function areas or departments
Criteria 4.a.i and 4.b.ii on page clxxvi.
1. Kitchens (excluding small staff kitchens and food technology rooms)
2. Computer suites
3. Workshops
4. Lecture halls
5. Conference rooms
6. Drama studios
7. Swimming pools
8. Sports halls
9. Process areas
10. Laboratories
11. High containment suites within laboratories
12. Controlled environment chambers
13. Animal accommodation areas
14. Data centres
15. IT work and study rooms, including IT-equipped library space and any space with provision of more than one computer terminal per 5m².
Individual sub-metering of standard classrooms or seminar rooms is not required.

### 2.11 Hospitals and other healthcare facilities relevant function areas or departments

Criteria 4.a.i and 4.b.ii on page clxxvii.

1. Operating departments
2. Imaging departments
3. Radiotherapy departments
4. Pathology departments
5. Dialysis departments
6. Medical physics facilities
7. Mortuary and post mortem departments
8. Rehabilitation when including hydrotherapy pools
9. Central sterile supplies departments (or equivalent)
10. Process areas, e.g. commercial-scale kitchens and laundries
11. IT rooms
12. Pharmacy departments
13. Laboratories
14. Tenancy areas (e.g. catering, retail, laundry)

In small healthcare buildings (<999m²) with no high energy load areas (as defined above), a single meter per floor plate is sufficient to achieve this credit. Individual areas within each floor plate do not need to be sub-metered.

### 2.12 Other buildings

Criteria 4.a.i and 4.b.ii on page clxxvii.

Other types of single occupant buildings should use the above lists of function areas as a guide to the level of sub-metering provision required to comply. The above should consider that the aim of the credit is to encourage the installation of energy sub-metering that facilitates the monitoring of in-use energy consumption (in this case by area).
Ene 02 Energy monitoring

Assessment criteria

One credit - Sub-metering of end use categories
1 Install energy metering systems so that at least 90% of the estimated annual energy consumption of each fuel is assigned to the end-use categories (see Methodology on the next page).
2 Meter the energy consumption in buildings according to the total useful floor area:
   2.a: If the area is greater than 1,000m², by end-use category with an appropriate energy monitoring and management system.
   2.b: If the area is less than 1,000m², use either:
      2.b.i an energy monitoring and management system or
      2.b.ii separate accessible energy sub-meters with pulsed or other open protocol communication outputs, for future connection to an energy monitoring and management system (see Definitions on page clxxix).
3 Building users can identify the energy consuming end uses, for example through labelling or data outputs.

One credit - Sub-metering of high energy load and tenancy areas
4 Monitor a significant majority of the energy supply with:
   4.a: An accessible energy monitoring and management system for:
      4.ai tenanted areas or
      4.ii relevant function areas or departments in single occupancy buildings.
   OR
   4.b: Separate accessible energy sub-meters with pulsed or other open protocol communication outputs for future connection to an energy monitoring and management system for:
      4.bi tenanted areas or
      4.b.ii relevant function areas or departments in single occupancy buildings.
5 Sub-meter per floor plate in large single occupancy or single tenancy buildings with one homogeneous function, for example hotel bedrooms, offices.

Compliance notes
Compliance notes are located in Appendix G – Notes for compliance on page 18 for the consultation. These compliance notes will be available through the knowledge base when the scheme goes live.
Methodology

Metering strategy
Detailed guidance on how to develop an appropriate metering strategy for the energy criteria of a new building is available in CIBSE TM39 Building energy metering\(^{130}\).

Estimating the annual energy consumption of each end use
Where the total consumption of any single end use category (or a combination of end use categories added together) is estimated to account for less than 10% of the annual energy consumption for a given fuel type, it is not necessary for this end use to be sub-metered. In this instance, the design team should demonstrate that the respective end use is expected to account for less than 10% of the annual energy consumption for the fuel type. Where a given end use will clearly account for less than 10% of the total annual energy consumption for the fuel type in question, a simple hand calculation or use of benchmark data to demonstrate this is acceptable.

Estimating the total annual energy consumption
Where it is unclear whether an end use would account for 10% of the annual energy consumption for a given fuel type or not, more detailed calculations should be provided. The total annual energy consumption should be estimated using a method that estimates actual energy consumption. The energy consumption for each end use may be estimated by using methods described in CIBSE TM54: Evaluating operational energy performance of buildings at the design stage\(^{131}\), using actual operational inputs (rather than those used for building regulations calculations). The weather data used should be the average current weather data for the local area. The data on water consumption from the Wat 01 Water consumption on page cdx issue may be used as inputs for evaluating the energy use of domestic hot water.

Combining end-use categories for metering purposes

Lighting and small power
Due to traditional distribution methods, it can be difficult to sub-meter separately and cost-effectively lighting and small power. Lighting and small power can be combined for metering purposes, as long as sub-metering is provided for each floor plate.

Heating and hot water
Space heating and domestic hot water may be combined with a single heat or gas meter per tenanted area or function area or department. This is acceptable where a common plant provides more than one building service (e.g., a boiler provides both hot water and space heating, or a reversible heat pump provides space heating and space cooling) and it is impractical to meter end uses separately.

Modular boiler systems
Modular boiler systems can be monitored as a whole.

Small function areas or departments
For a building consisting of a number of small function areas or departments, sub-metering the heating, hot water and combined electricity energy uses is sufficient to achieve this credit. Individual electricity energy uses within each unit do not need to be sub-metered. For the purpose of this BREEAM issue, a small function area or department is defined as less than 200m\(^2\).
Extensions to existing buildings

If assessing a new extension to an existing building, the criteria only apply to the new extension. In this case, energy services supplying energy to the end use categories from the existing building shall, as a minimum, be metered by fuel at the entry points to the extension. However, the best practice approach would usually be to ensure that the energy metering covers the entire building.

Evidence

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Interim design stage</th>
<th>Final post-construction stage</th>
</tr>
</thead>
<tbody>
<tr>
<td>All</td>
<td>One or more of the appropriate evidence types listed in <em>The BREEAM evidential requirements on page 38</em> can be used to demonstrate compliance with these criteria.</td>
<td></td>
</tr>
</tbody>
</table>

Definitions

Accessible meters

Energy meters located in an area of the building that allows for easy access to facilitate regular monitoring and readings by the building occupant or facilities manager. Typically this will be the plant room, main distribution room or control room (where a building energy management system (BEMS) is installed).

Common areas

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

End-use categories

End-use categories include:

1. Space heating
2. Domestic hot water heating
3. Humidification*
4. Cooling*
5. Ventilation, i.e. fans (major)*
6. Pumps
7. Lighting
8. Small power
9. Renewable or low carbon systems (separately)
10. Controls
11. Other major energy consuming systems or plant, where appropriate. Depending on the building type, this might include for example: plant used for swimming or hydrotherapy pools; other sports and leisure facilities; kitchen plant or catering equipment; office equipment; cold storage plant; laboratory plant; sterile services equipment; transport systems (e.g. lifts and escalators); drama studios and theatres with...
large lighting rigs; telecommunications; dedicated computer room or suite; server rooms; dealing rooms; covered car parks; ovens or furnaces; and floodlighting. See also CIBSE TM39: Building energy metering for further information.

The systems succeeded by * must not be present where a BREEAM New Construction Simple Building assessment is being carried out.

Energy monitoring and management system
Examples include automatic meter reading systems and building energy management systems (BEMS). Automatic monitoring and targeting) is an example of a management tool that includes automatic meter reading and data management.

Energy supply
All types of energy supplied to a building area (function area, department, tenancy or unit) within the boundary of the assessed development. These types of energy include electricity, gas, heat or other forms of energy or fuel that are consumed in each relevant area.

Energy meters
Energy meters measure the amount of energy used on a circuit where energy is flowing. Primary meters measure the main incoming energy 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 the second tier including heat and steam meters and secondary meters installed to measure consumption by specific items of plant or equipment, or to discrete physical areas, e.g. individual buildings, floors in a multi-storey building, tenanted areas, function areas.

Major fans
Major fans typically include fans in air handling units. Where multiple fans are within an air handling unit, they can be metered as one unit. Small fans such as individual extract fans for single rooms, such as kitchen, bathroom and toilet areas, are not required to be included where they only account for a small proportion of the total annual energy use.

Modular boiler systems
A modular boiler system consists of a series of boilers that are linked together to meet a variety of heating demands. They are generally composed of several identical boiler units, sometimes stacked, although a mix of condensing and conventional boilers could be used. They operate in increments of capacity, each at around their full capacity and their peak efficiency, so that the overall part load efficiency is greater than it would be for a single boiler.

Significant majority
A significant majority of the energy supply to the tenanted areas or departments covers most of the energy uses but does not have to include very small ones. As a guide, energy uses that cumulatively make up less than 10% of the energy supply for that area may be excluded.

Sub-meter outputs
Examples include pulsed outputs and other open protocol communication outputs, such as Modbus.
Additional information

Building regulations requirements

The building regulations for energy use in all four countries of the UK require energy meters to be provided to allow the use of fuel and power consumption to be monitored. The building regulations of Wales, Northern Ireland and England also require energy meters to be provided that enable at least 90% of the estimated annual energy consumption of each fuel to be assigned to the various end-use categories (heating, lighting etc.) with separate monitoring of any renewable systems. Buildings with a total floor area greater than 1,000m² are also required to have automatic meter reading and data collection facilities. This has to be considered for larger buildings in Scotland. The Scotland building regulations recommend that solid mineral fuel or biomass use is recorded, where applicable, and they require separate monitoring of low carbon equipment, including combined heat and power installations. The metering provisions are required to be designed to facilitate the benchmarking of energy performance as set out in CIBSE TM46 Energy benchmarks (132).
Ene 03 External lighting

Fully fitted | Simple building | Shell & core | Shell only | No Minimum standard

Aim

To reduce energy consumption through the specification of energy efficient light fittings for external areas of the development.

Value

- Reduce the energy consumption, associated with external light fittings left on during the day and when no one is present, thereby reducing CO₂ emissions and operating costs.
- Reduce the dependence on external lighting for safety and comfort

Context

External lighting is often necessary to provide a sense of security at night, clear, safe and attractive access to people and contribute to the regeneration of urban areas[133]. External light fittings can often result in relatively high energy usage as a result of poor specification of fittings and controls as well as inadequate maintenance. External
lighting fittings with the highest luminous efficacy and their efficient utilisation can reduce the energy consumption and associated costs attributed to essential external lighting while providing a pleasant and safe environment.

### Assessment scope

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<tr>
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<th>Shell and core</th>
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</thead>
<tbody>
<tr>
<td>Assessment type specific notes</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>None</td>
</tr>
</tbody>
</table>

**Assessment type specific**

None

**Building type specific**

2.0 **Prisons and other secured buildings**

The criteria apply only to general external lighting, e.g. way-finding, car parking, decorative, signage, landscape, storage areas etc. Lighting specified for specific security purposes within secured buildings, such as prisons, can be excluded from the assessment of this issue.
Ene 03 External lighting

Assessment criteria

One credit
1. No external lighting (which includes lighting on the building, at entrances and signs).

OR
2. External light fittings within the construction zone with:
   2.a: Average initial luminous efficacy of no less than 70 luminaire lumens per circuit Watt.
   2.b: Automatic control to prevent operation during daylight hours.
   2.c: Presence detection in areas of intermittent pedestrian traffic.

Compliance notes
Compliance notes are located in Appendix G – Notes for compliance on page 18 for the consultation. These compliance notes will be available through the knowledge base when the scheme goes live.

Methodology

Average initial luminous efficacy of the external light fittings
The individual luminous fluxes of all luminaires within the construction zone are summed (in lumens), then divided by the total circuit Watts for all the luminaires.

For lamps other than LED lamps, the luminous flux of a luminaire using those lamps can be determined by multiplying the sum of the luminous fluxes produced by all the lamps in the luminaire by the light output ratio of the luminaire (as confirmed by the luminaire manufacturer).

LED lamps are typically integral to the luminaire (LED luminaires). As such, the manufacturers’ literature will encompass both lamp and luminaire as a whole.

Single building assessments on larger developments or campuses and extensions to existing buildings
If the assessed building is part of a larger development containing common areas and other buildings, or is a new extension to an existing building, the external lighting criteria apply only to external new and existing lighting within the construction zone of the assessed building.
Different types of external lighting and exceptions to the criteria

Temporary lighting, decorative lighting and floodlighting
Temporary lighting such as theatrical, stage or local display installations can be excluded from the assessment of this issue. Decorative lighting and floodlighting must however be assessed for this issue.

Emergency lighting
Emergency light fittings, including security lighting, that are also used for normal operation are assessed for this issue. Non-maintained lighting which only activates in an emergency can be excluded from the assessment of this issue.

Evidence

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Interim design stage</th>
<th>Interim post-construction stage</th>
</tr>
</thead>
<tbody>
<tr>
<td>All</td>
<td>One or more of the appropriate evidence types listed in The BREEAM evidential requirements on page 38 can be used to demonstrate compliance with these criteria.</td>
<td></td>
</tr>
</tbody>
</table>

Definitions

Areas of intermittent pedestrian traffic
An area can be considered of intermittent pedestrian traffic where someone is in or approaching the space less than two thirds of the time during the period when the lighting, without presence detection, would be switched on.

Automatic control
An automatic external lighting control system prevents operation during daylight hours through either a time switch or a daylight sensor (a manually switched lighting circuit with daylight sensor or time switch override is also acceptable). In addition to the above, the system should provide presence detection in areas of intermittent traffic. For external lighting not fitted with presence detectors, time switches must provide automatic switch off of lighting after a specified curfew hour, except in cases where there is a specific requirement for lighting to be left on all night.

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

Daylight sensor
A type of sensor that detects daylight and switches lighting on at dusk and off at dawn.
Luminous efficacy in luminaire lumens per circuit Watt
The ratio between the luminous flux produced by an entire luminaire (light fitting) (in lumens) and the total power consumed by the lamps and the control gear contained within the luminaire (Watts).

Presence detector
A sensor that can turn lighting on when a presence is detected in the scanned area, and off after a pre-set time when no presence is detected. Presence detectors must be compatible with the lamp type used as very frequent switching can reduce the life of some lamp types.

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

Additional information
None.
Ene 04 Low carbon design

Aim

To encourage the adoption of design measures, which reduce building energy consumption and associated carbon emissions and minimise reliance on active building services systems.

Value

- Maximise the financial and environmental benefits of adopting passive and other low carbon solutions throughout the design process
- Encourage the use of free heating and cooling strategies, to reduce the building’s energy demands and eliminate or reduce the use of active cooling
- Ensure that the most appropriate low or zero carbon technologies (LZC) are adopted for the project
- Promote innovation to deliver practical and cost effective low carbon building design.

Context

Factors such as the building massing, layout, orientation, fabric design, daylighting provision, ventilation strategies and thermal mass will significantly affect the heat gains and losses in a building. Air-conditioning is a high energy user and can conflict with more biophilic approaches to health and wellbeing. It should be avoided or minimised where possible as its adoption will typically increase operational energy costs by around 50% to the running costs of the building. The range of low and zero carbon technologies that supply electricity and heat is growing.
rapidly and capital and operating costs are decreasing with economies of scale. This is often making them a cost effective solution achieving a reduction in operational CO₂ emissions.

**Assessment scope**

<table>
<thead>
<tr>
<th>Applicable assessment criteria</th>
<th>Fully fitted</th>
<th>Simple building</th>
<th>Shell and core</th>
<th>Shell only</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assessment type specific notes</td>
<td>None</td>
<td>See ref. 1.0 and 1.1</td>
<td>None</td>
<td>See ref. 1.2–1.4</td>
</tr>
</tbody>
</table>

### Assessment type specific

1.0 **Microgeneration technologies**
   - On-site LZC technologies are only acceptable where the proposed solution can be classified as a microgeneration technology. The requirements for classification as a microgeneration technology are described in Ene 04 Low carbon design Methodology on page clxxxix.

1.1 **Low zero carbon feasibility study**
   - Criteria 9–12
   - A simplified version of a LZC feasibility study will be acceptable when assessing a Simple building. Items 9 and 10 listed in CN1.3 are not applicable.

1.2 **Passive design analysis**
   - Criteria 1–5
   - The first criterion of Ene 04 Low carbon design on page clxxxix is not applicable to Shell Only assessments. However, to achieve the Ene 04 Passive design analysis credit, compliance with Ene 04 Low carbon design on page clxxxix criteria 1, 2 and 3bii must be demonstrated.

1.3 **Free cooling**
   - Criteria 5–8
   - Only free cooling options 1 to 3 listed in compliance note CN1.1 are applicable.

1.4 **Low zero carbon feasibility study**
   - Criterion 9: The LZC feasibility study must be completed as part of the shell only design, based on the expected building use and loads specified in the design brief, or where these are not specified, for likely scenarios.
   - Criterion 1.2: The built form should allow for the future installation of the most cost effective LZC options.

### Building type specific

2.0 **Schools: information communication technology (ICT) classrooms**
   - With respect to the free cooling credit, it is possible for ICT classrooms to be designed to avoid the use of active cooling. Hence, they are not exempt from the requirements of this issue. If active cooling is used to treat these spaces, it would not be possible to achieve the free cooling credit within this BREEAM issue.
This issue is split into two parts:

- Passive design (2 credits)
- Low or zero carbon technologies (1 credit).

### Two credits - Passive design

**One credit - Passive design analysis**

1. Achieve the first credit Hea 04 Thermal comfort on page cxxviii to demonstrate that the building design delivers appropriate thermal comfort levels in occupied spaces.

2. The project team analyses the proposed building design and development during Concept Design stage (RIBA Stage 2 or equivalent) to identify opportunities for the implementation of passive design measures (see Passive design analysis on the next page).

3. Implement passive design measures to reduce the total heating, cooling, mechanical ventilation, lighting loads and energy consumption in line with the passive design analysis findings.

4. Quantify the reduced total energy demand and carbon dioxide (CO₂) emissions resulting from the passive design measures.

**One credit - Free cooling**

5. Achieve the passive design analysis credit.

6. Include a free cooling analysis (see Free cooling analysis on the next page) in the passive design analysis carried out under criterion 2.

7. Identify opportunities for the implementation of free cooling solutions.

8. The building is naturally ventilated or uses any combination of the free cooling strategies listed in Free cooling analysis on the next page.

### One credit - Low and zero carbon technologies

**One credit - Low zero carbon feasibility study**

9. An energy specialist (see Definitions on page cxciv) completes a feasibility study (see Low and zero carbon feasibility study on page cxi) by the end of the Concept Design stage (RIBA Stage 2 or equivalent).

10. Establish the most appropriate recognised local (on site or near site) low or zero carbon (LZC) energy sources for the building or development, (see Scope of LZC systems and how they are assessed on page cxi), based on the feasibility study.

11. Specify local LZC technologies for the building or development in line with the feasibility study recommendations.

12. Quantify the reduced regulated carbon dioxide (CO₂) emissions resulting from the feasibility study.
Compliance notes

Compliance notes are located in Appendix G – Notes for compliance on page 18 for the consultation. These compliance notes will be available through the knowledge base when the scheme goes live.

Methodology

Passive design analysis

As a minimum, the passive design analysis should cover:

1. Site location
2. Site weather
3. Microclimate
4. Building layout Low and zero carbon feasibility study on the facing page
5. Building orientation
6. Building form
7. Building fabric
8. Thermal mass or other fabric thermal storage
9. Building occupancy type
10. Daylighting strategy
11. Ventilation strategy
12. Adaptation to climate change.

Any savings resulting from the incorporation of passive design measures should be demonstrated by comparing the energy demand or CO₂ emissions for the building with and without the proposed passive design measures adopted, as identified in the passive design analysis.

To enable a baseline for comparison to be established, a ‘standard building’ should be modelled with fabric performance equivalent to that of the local building regulations notional building (or for Scotland, an equivalent compliant building) and without the passive design measures (where feasible, i.e. building orientation is likely to be fixed). The glazing areas should remain the same in both models.

With the exception of any changes to account for passive design measures and fabric performance, this ‘standard building’ should be modelled as equivalent to the actual building.

Any savings in energy demand or CO₂ emissions should then be calculated by comparing the respective Building Emission Rate (BER) outputs from two building models representing the ‘proposed building’ specification (fixed at a point as agreed by the project team and assessor), and the ‘standard building’ specification.

These calculations should be carried out by a building services engineer who is a member of the Chartered Institute of Building Services Engineers (CIBSE) or by an accredited energy assessor (see Definitions on page cxciv).

Free cooling analysis

The free cooling analysis should demonstrate consideration of the following technologies:

1. Night time cooling (which could include the use of a high exposed thermal mass)
2. Ground coupled air cooling
3. Displacement ventilation (not linked to any active cooling system)
4. Ground water cooling
5. Surface water cooling
6. Evaporative cooling, direct or indirect
7. Desiccant dehumidification and evaporative cooling, using waste heat
The free cooling should apply to all occupied spaces in the building. Small IT rooms and lift motor rooms are excluded.

It should be demonstrated that the free cooling can meet the building’s cooling demand. The calculation methods should take into account the passive design measures included in the analysis and should be carried out by a building services engineer who is a member of the Chartered Institute of Building Services Engineers (CIBSE) or by an accredited energy assessor. Where the free cooling approaches chosen cannot be adequately modelled by these methods, the use of any alternative methods should be justified by the building services engineer or accredited energy assessor, demonstrating that these methods are appropriate.

Low and zero carbon feasibility study

The low zero carbon feasibility study should cover as a minimum:

1. Energy generated from LZC energy source per year
2. Carbon dioxide savings from LZC energy source per year
3. Life cycle cost of the potential specification, accounting for payback
4. Local planning criteria, including land use and noise
5. Feasibility of exporting heat or electricity from the system
6. Any available grants
7. All technologies appropriate to the site and energy demand of the development.
8. Reasons for excluding other technologies
9. If appropriate:
   a. The building is connected to an existing local community CHP system or
   b. the building is connected to an existing source of waste heat or power OR
   c. a building or site CHP system is specified with the potential to export excess heat or power via a local community energy scheme or
   d. a source of waste heat or power is specified with the potential to export excess heat or power via a local community energy scheme.

The reduction in regulated carbon dioxide (CO₂) emissions can be demonstrated by comparing regulated carbon dioxide (CO₂) emissions with LZC technologies to the actual building regulated emissions without LZCs. When the CO₂ savings are compared for different technologies, they may be estimated separately from the building energy model where appropriate, e.g. by using manufacturers’ data, simple hand calculations or spreadsheets. For the specified technologies, any CO₂ savings are estimated using dynamic simulation modelling. The energy supply used for the base case is mains gas and grid electricity. If mains gas is not available on site, then oil may be used instead. The base case includes any passive design or free cooling measures adopted for the first two credits. The actual building energy demands are calculated as for the passive design analysis. The carbon dioxide emissions factors used for the building regulations calculations are then applied.

Scope of LZC systems and how they are assessed

Recognised local LZC technologies

Technologies eligible to contribute to achieving the criteria must produce energy from renewable sources and meet all other ancillary requirements as defined by Directive 2009/28/EC.

The following requirements must also be met:

1. There must be a direct supply of energy produced to the building under assessment.
2. Technologies under 50kWe or 45kWth must be certified by a Microgeneration Certification Scheme (MCS), or equivalent, and installed by MCS (or equivalent) certified installers.
3. Combined heat and power (CHP) schemes above 50kW must be certified under the CHPQA standard. CHP schemes fuelled by mains gas are eligible to contribute to performance against this issue.
4. Heat pumps can only be considered as a renewable technology when used in heating mode. Refer to Annex VI of Directive 2009/28/EC for more detail on accounting for energy from heat pumps.
5. Where MCS or CHPQA certification is not available, the design team must investigate the availability of alternative accreditation schemes in line with the Directives listed above, or an equivalent country or
regional directive or standard. Where an accreditation scheme exists, it should be used for the purpose of verifying compliance of the specified LZC technology. If no accreditation scheme exists in the country, the design team must demonstrate they have investigated the competence of the installer selected and are confident that they have the skill and competence to install the LZC technology appropriately.

**Novel LZC technology not listed**

Other systems may be acceptable as part of a LZC strategy under this issue but are not currently included as LZC technologies in any of the approved building energy calculation software packages. Acceptability will be dependent on the nature of the system proposed and the carbon benefits achieved. The BREEAM Assessor must confirm acceptability with BRE before an assessment is submitted. The calculation procedure for the new LZC technology should be submitted for consideration as a ‘novel technology’ to be included in the ‘SBEM-Q’ innovation process (see Additional information on page cxv).

The novel technology would only be acceptable for the LZC credit if EITHER:

1. It is already demonstrably modelled in one of the approved dynamic simulation compliance tools;
2. The calculation procedure has been accepted by the SBEM-Q process and integrated into the SBEM tool; OR
3. It has been applied for and is in the process of being accepted for SBEM-Q.

For one-off LZC technology designs, where it is not viable to obtain SBEM-Q approval, an application for a BREEAM approved innovation credit can be submitted to BRE.

**LZC technology already available on site**

For developments where there is an existing LZC energy source that can supply a compliant percentage of energy to the assessed building, a feasibility study will still have to be carried out to demonstrate that the existing technology is the most appropriate for the assessed building or development. The study should seek to identify any other options to supply a higher proportion of the building’s energy demand in addition to that supplied by the existing source. In order to be compliant, the LZC energy source must continue to provide low carbon energy to existing buildings and provide additional low carbon energy to the new building.

**Waste heat from a building-related operational process**

Waste heat from an operational process that takes place within the assessed building (or on the assessed site) can be considered as ‘low carbon’ for the purpose of this BREEAM issue. This is on the condition that the generation of the heat from the process is integral to the assessed building. Examples of operational processes and functions include manufacturing processes, high temperature oven or kiln, compressors serving process plant, micro-brewery, 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.

**Community and near-site schemes**

This BREEAM issue seeks to encourage the installation of on-site and near-site LZC technologies. ‘Local’ does not have to mean on-site; community schemes (near site) can be used as a means of demonstrating compliance.

**Waste heat from incineration**

Waste heat from an incineration plant can only be considered as low carbon for the purpose of this BREEAM issue under the following circumstances:

1. All other LZC technologies have been considered and discounted in the feasibility study and; EITHER
2. The local authority or region in which the incineration plant is located is demonstrably meeting its annual waste reuse and recycling targets and waste management policies; OR
3. There is a near or on-site facility connected to the building, via a private wire arrangement, which is demonstratedly removing reusable and recyclable waste material prior to incineration.
Biofuels

First generation biofuels

BREEAM does not recognise or reward building systems fuelled by first generation biofuels manufactured from feedstocks, e.g. biofuels manufactured from sugars, seeds, grain, animal fats etc. where these are grown or farmed for the purposes of biofuel production. This is due to the current uncertainty over their impact on biodiversity, global food production and greenhouse gas savings, plus the ease of inter-changeability between fossil fuels. BREEAM may recognise systems using second generation biofuels (see Definitions on the next page) 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, where these are not interchangeable with fossil fuels or first generation biofuels.

Second generation biofuels and biofuels from waste streams

BREEAM recognises that biofuels produced from biomass which is a byproduct of other processes may provide a more sustainable alternative to fossil fuels. Typically, these use waste feedstock consisting of residual non-food parts of current food crops, industry waste such as woodchips, other waste vegetable matter and waste fish oil from sustainable fish stocks to produce biofuel. Such biofuels will, in principle be recognised by BREEAM for the purposes of defining low or zero carbon technologies. However due to the emerging nature of such technologies, full details would be required for review by BRE Global prior to confirmation of acceptability, including the following:

1. Type, provenance and sustainability of the biomass feedstock
2. Avoidance or minimisation of fossil fuel use in extracting the biofuel
3. Minimising fossil fuel use in transporting the biomass or biofuel
4. Presence of a supply agreement and a robust supply chain
5. Compatibility of the biofuel with the specified boiler or plant and manufacturer's warranty issues

The use of other recycled or waste-derived biofuels such as waste oil from catering may also be recognised by BREEAM subject to the above criteria. For smaller scale applications, the assessor will also need to demonstrate that the biofuel is locally sourced. BREEAM does not qualify the term 'locally sourced' or specify a minimum supply contract. However the assessor must determine and demonstrate that these are reasonable for the particular application.

Evidence

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Interim design stage</th>
<th>Final post-construction stage</th>
</tr>
</thead>
<tbody>
<tr>
<td>All</td>
<td>One or more of the appropriate evidence types listed in The BREEAM evidential requirements on page 38 can be used to demonstrate compliance with these criteria.</td>
<td>As per interim design stage.</td>
</tr>
<tr>
<td>4</td>
<td>Results from a dynamic simulation model demonstrating the reduced energy demand and CO₂ emissions from the specified passive design measures.</td>
<td>As per interim design stage.</td>
</tr>
<tr>
<td>8</td>
<td>Results from a dynamic simulation model and other used methods demonstrating that the free cooling strategy can meet the building's cooling demand.</td>
<td>As per interim design stage.</td>
</tr>
<tr>
<td>12</td>
<td>Results from a dynamic simulation model demonstrating reductions in CO₂ emissions from the specified low zero carbon technology.</td>
<td>As per interim design stage.</td>
</tr>
</tbody>
</table>
Definitions

**Accredited energy assessor**
A person registered with an accredited energy assessment scheme provider. The scheme provider will be licensed by the relevant government department to accredit competent persons in the energy assessment of non-domestic or domestic buildings for the purposes of demonstrating compliance with the building regulations in the country of origin. The energy assessor should be appropriately accredited for the building being assessed. For a full list of approved accreditation schemes or organisations for energy assessors and links to registers of accredited energy assessors visit: [www.ndepregister.com](http://www.ndepregister.com) (non-domestic), [www.epcregister.com](http://www.epcregister.com) (domestic)


1. Wales: [https://www.ndepregister.com](https://www.ndepregister.com) (non-domestic), [www.epcregister.com](http://www.epcregister.com) (domestic)

Only individuals that appear on the DCLG register for England and Wales, the Department of Finance register for Northern Ireland and the Scottish Government register are qualified as accredited energy assessors.

**Approved building energy calculation software**
Software approved for the purpose of demonstrating compliance with the energy efficiency and carbon emission requirements of the building regulations (and in turn compliance with the EPBD recast 2012). The definition includes the SBEM and its interface ISBEM, as well as third-party software approved by the relevant government department. A list of approved software for non-domestic buildings for Wales is provided here: [www.ncm.bre.co.uk](http://www.ncm.bre.co.uk)

A list of approved software for non-domestic buildings for Scotland is provided here: [www.scotland.gov.uk](http://www.scotland.gov.uk)

A list of approved software for non-domestic buildings for Northern Ireland is provided here: [www.ncm.bre.co.uk](http://www.ncm.bre.co.uk)

A list of approved software for non-domestic buildings for England is provided here: [www.ncm.bre.co.uk](http://www.ncm.bre.co.uk)

A list of approved software for non-domestic buildings is as follows:

2. Wales, Northern Ireland and England: [www.ncm.bre.co.uk](http://www.ncm.bre.co.uk)

Approved building energy calculation software will provide the data required for calculating the EPR NC and BREEAM Ene 01 credits. Please note that for dwellings (where relevant to the assessment of multi-residential buildings), the government’s SAP may be used. The current version is SAP 2012 version 9.92 (October 2013).

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

**First and second generation biofuels**
First generation biofuels are fuels made from sugar, starch, vegetable oil, or animal fats using conventional technology. Second generation biofuels are fuels from lignocellulosic biomass feedstock using advanced technical processes (135). Common first-generation biofuels include vegetable oil, biodiesel and bioalcohols.
Free cooling
The ability of the building to provide cooling to the internal occupied areas without the need to rely on energy consuming mechanical cooling. Free cooling is an enhanced passive design method that requires engineering design and modelling to demonstrate its effectiveness. Other similar methods include enhanced passive ventilation and enhanced daylighting.

Microgeneration Certification Scheme (MCS)
The MCS is an independent scheme that certifies microgeneration products and installers in accordance with consistent standards. It is designed to evaluate microgeneration products and installers against robust criteria, and provides consumers with an independent indication of the reliability of products, assurance that the installation will be carried out to the appropriate standard and a route for complaints should there be any issues. The MCS is a United Kingdom Accreditation Service (UKAS) accredited certification scheme covering all microgeneration products and services. It has support from the Department of Energy and Climate Change (DECC), industry and non-governmental groups as a prime method for making a substantial contribution to cutting the UK’s dependency on fossil fuels and carbon dioxide emissions.

Near-site LZC
A LZC source of energy generation located near to the site of the assessed building. The source is most likely to be providing energy for all or part of a local community of buildings, including the assessed building, e.g. decentralised energy generation linked to a community heat network or renewable electricity sources connected via a private wire arrangement.

On-site LZC
A LZC source of energy generation which is located on the same site as the assessed building.

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

Additional information

Free cooling aim
The aim of the free cooling credit is to remove the need for active cooling throughout the building. The implementation of free cooling technologies results in the reduction of energy consumption associated with the building’s cooling. It can also make the building much simpler to operate and maintain than one with active cooling.

Novel low and zero carbon (LZC) technologies - SBEM-Q
In order to deal with the integration of new technologies into SBEM, a new procedure has been established which mirrors the SAP Appendix Q approach to some extent. Appendix Q provides a means whereby validated individual branded product performance information can be accessed and used as an adjunct to the SAP calculation. A product’s performance information is determined by testing against a specification that has been agreed by DECC’s NCM contractor, the relevant manufacturers and industry sector representatives. Product data are listed in the SAP Appendix Q database (at www.ncm-pcdb.org.uk/sap). By following the ‘innovation’ path from that website, manufacturers can apply for novel LZC technologies to be validated under the so-called ‘SBEM-Q’ procedure and then integrated as part of an amendment to the SBEM calculation.
LZC feasibility study in building regulations

The EPBD (recast) 2012 (Directive 2010/31/EU), requires that all member states have a methodology for calculating the energy performance of buildings and that the feasibility of high efficiency alternative systems is considered before construction starts, including energy from renewable sources, cogeneration, district heating and cooling and heat pumps (Article 6). This requirement has been included in the building regulations for England (amendment Regulation 25A, 2013), Scotland (June 2016) and Wales (Regulation 25A 2014). The LZC feasibility study in BREEAM is intended to encourage the study to be done early in the project, not just before construction starts, so that the most appropriate solutions can be adopted. Also, this credit does not permit technologies that are not best practice or sustainable or cannot be modelled with a robust method.

Passive design aim

Unlike Ene 01 Reduction of energy use and carbon emissions on page cxi (which is focused on demonstrable and robust performance improvement), Ene 04 - Low carbon design aims to encourage project teams to consider a particular design approach. The passive design analysis credit is intended to encourage project teams to proactively consider the ways in which the building could benefit from, and adopt passive design measures (such as those listed in Passive design analysis on page cxc)
Ene 05 Energy efficient cold storage

Aim

To encourage the installation of energy efficient refrigeration systems, in order to reduce operational greenhouse gas emissions resulting from the system’s energy use.

Value

- Promote the design installation of energy efficient refrigeration system, controls and components in accordance with best practice industry standards
- Ensure that the commissioning of the refrigeration plant is properly planned and will result in the system performing as designed, therefore promoting an optimal performance.
- Encourage the installation of refrigeration systems that demonstrate savings in indirect greenhouse gas emissions.

Context

About 15% of the world’s electricity is used to drive refrigerating and air-conditioning systems. Therefore, refrigeration accounts for significant energy consumption in certain sectors, such as retail and industrial. Improving the efficiency of the refrigeration plant can result in less waste of valuable energy resources and less impact to
global warming, less likelihood of breakdown and significant running cost savings. Through proper operation, maintenance and re-commissioning, cost savings of up to 50% and improved reliability can be achieved(137).

Assessment scope

<table>
<thead>
<tr>
<th></th>
<th>Fully fitted</th>
<th>Simple building</th>
<th>Shell and core</th>
<th>Shell only</th>
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<td>Assessment type specific notes</td>
<td>None</td>
<td>None</td>
<td>See ref. 1.0</td>
<td>None</td>
</tr>
</tbody>
</table>

**Assessment type specific**

1.0 Where cold storage systems are specified or installed, all assessment criteria relevant to the building type and function apply.

**Building type specific**

None
Ene 05 Energy efficient cold storage

Assessment criteria

One credit - Refrigeration energy consumption
1 Design, install and commission the refrigeration system:
   1.a: In accordance with the Code of Conduct for carbon reduction in the refrigeration retail sector (138) (see Additional information on page cci) and BS EN 378-2:2016 (139).
   1.b: Using robust and tested refrigeration systems or components included on the Enhanced Capital Allowance (ECA) Energy Technology Product List (ETPL) (140) or an equivalent list (see Components on the ECA Energy Technology Product List on the next page for a list of components).

2 Commission the refrigeration plant in compliance with the commissioning criteria in BREEAM issue Man 04 Commissioning and handover on page boi.

One credit - Indirect greenhouse gas emissions
3 Achieve criteria 1 and 2.
4 Demonstrate a saving in indirect greenhouse gas emissions (CO₂ eq.) from the installed refrigeration system over the course of its operational life.

Compliance notes
Compliance notes are located in Appendix G – Notes for compliance on page 18 for the consultation. These compliance notes will be available through the knowledge base when the scheme goes live.

Methodology

Scope of Ene 05 issue
This issue is applicable only in instances where commercial or industrial sized refrigeration and storage systems are specified, for example:
1. Storage and refrigeration of food in supermarkets
2. Cold storage facilities in industrial, laboratory, healthcare and other buildings.

The criteria do not apply to:
1. Domestic scale refrigeration or
2. Refrigeration for kitchen and catering facilities where these are self-contained units not connected to building cooling systems.

These types of installation are covered within BREEAM issue Ene 08 Energy efficient equipment on page ccw. If the building contains no refrigeration systems or only refrigeration systems that are standalone, i.e. are not integral to
the building and served by the building services, this issue is not applicable to the assessment. The scope of this issue covers freezer or cold storage rooms which are integral to the building and served by the building’s own refrigeration systems.

Calculating indirect greenhouse gas emissions (eq.)

The indirect emissions must be calculated in accordance with the procedures in BSEN 378-1:2016\(^\text{(141)}\). Refrigerating system and heat pumps safety and environmental requirements, Annex B. Further detail on applying this method to calculate the indirect emissions are available in the Guideline methods of calculating Total Equivalent Warming Impact (TEWI\(^\text{(142)}\)) published by the British Refrigeration Association (BRA).

Calculations must be carried out by an appropriately qualified professional (e.g. a building services engineer), including calculations to justify for assumptions and methodologies for savings in indirect greenhouse emissions.

The Carbon Trust Refrigeration Road Map

The Carbon Trust Refrigeration Road Map\(^\text{(143)}\) introduces the main energy saving opportunities for refrigeration use in the retail sector and defines a 'baseline supermarket'. The savings in indirect greenhouse gas emissions can be demonstrated through specification of technologies described in CO\(_2\) emissions saving options available when designing a new store or retail concept that delivers savings in comparison with the 'baseline' building.

Many of the technologies outlined in the Road Map are appropriate to non-food applications and therefore to non-retail building types that specify or install cold storage refrigeration systems. If the 'baseline supermarket' does not provide an appropriate benchmark for achieving the second credit, the design team can still comply with the criteria by demonstrating a reduction in indirect greenhouse gas emissions (CO\(_2\) eq.) against an alternative baseline. The design team must confirm details of the alternative baseline system used, and demonstrate that it is based on a typical installation or technology for that building type. The systems being compared must have the same duty and service conditions and include the relevant consumption from the refrigeration system’s ancillary equipment.

Components on the ECA Energy Technology Product List

Where specified as part of the refrigeration system, products used for the following components must be listed on the ECA Energy Technology Product List (or equivalent list):

1. Air-cooled condensing units
2. Automatic air purgers
3. Cellar cooling equipment
4. Commercial service cabinets (cold food storage)
5. Curtains, blinds, sliding doors and covers for refrigerated display cabinets
6. Evaporative condensers
7. Forced air pre-coolers
8. Refrigerated display cabinets
9. Refrigeration compressors
10. Refrigeration system controls.

Extensions to existing buildings

If assessing a new extension to an existing building and there is cold storage plant in the existing building that will serve the new extension, then this plant must meet the criteria in order to achieve any available credits.
Evidence

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Interim design stage</th>
<th>Final post-construction stage</th>
</tr>
</thead>
<tbody>
<tr>
<td>All</td>
<td>One or more of the appropriate evidence types listed in The BREEAM evidential requirements on page 38 can be used to demonstrate compliance with these criteria.</td>
<td>Refrigeration plant commissioning record.</td>
</tr>
</tbody>
</table>

Definitions

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

Indirect operational greenhouse gas emissions
These are the indirect greenhouse gas emissions that result from the production of energy used to power the refrigeration system’s, cooling plant. This includes the emissions from the production of grid electricity or an on-site source of energy generation, e.g. gas CHP. In the case of refrigeration systems, the term ‘direct greenhouse gas emissions’ is also used; this refers to the emissions that occur as a direct result of leakage of refrigerant from the system.
The impacts of direct greenhouse gas emissions from refrigeration systems are dealt with in the BREEAM issue Pol01 Impact of refrigerants on page 382. Therefore, only indirect emissions resulting from the energy consumption of the system are covered in this issue.

Additional information

Code of conduct for carbon reduction in the retail refrigeration sector
The code of conduct has been developed by the Carbon Trust, in partnership with the Institute of Refrigeration and the British Refrigeration Association (BRA). The code is intended to compliment the Carbon Trust Refrigeration Road Map.
Ene 06 Energy efficient transport systems

- Fully fitted
- Simple building
- Shell & core
- Shell only
- No Minimum standard

Aim

To encourage the specification of energy efficient transport systems within buildings.

Value

- Ensure that transport types and arrangement systems are best suited to usage patterns and demand
- Promote the use of energy efficient features, in line with best industry practice guidelines
- Maximise the use benefit and satisfaction with transport systems

Context

Although issues such as safety, space restrictions and users’ comfort are prioritised by lift and escalators manufacturers, energy efficiency of transport systems has been a increasing concern in the last decades. An increase in lift and escalators provision is expected in the near future due to the need for convenience and comfort, the growing ageing population and the urbanisation effect. The energy consumption of lifts and escalators is estimated between 3 to 5 % of the overall consumption of a building. The design and specification of energy
Energy efficient transport technologies has become one of the key interests of manufacturers, that drives competition on the market and helps customers save energy and operational costs.

### Assessment scope

<table>
<thead>
<tr>
<th></th>
<th>Fully fitted</th>
<th>Simple building</th>
<th>Shell and core</th>
<th>Shell only</th>
</tr>
</thead>
<tbody>
<tr>
<td>Applicable assessment criteria</td>
<td>All</td>
<td>1–3</td>
<td>All</td>
<td>None</td>
</tr>
<tr>
<td>Assessment type specific notes</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>None</td>
</tr>
</tbody>
</table>

**Assessment type specific**  
None

**Building type specific**  
None
Ene 06 Energy efficient transport systems

Assessment criteria

One credit - Energy consumption
1. For specified lifts, escalators or moving walks (transport types):
   1.a: Analyse the transport demand and usage patterns for the building to determine the optimum number and size of lifts, escalators or moving walks.
   1.b: Calculate the energy consumption in accordance with BS EN ISO 25745 Part 2\(^{145}\) or Part 3\(^{146}\) for one of the following:
      1.b.i: At least two types of system for each transport type required; OR
      1.b.ii: An arrangement of systems for example for lift systems, hydraulic, traction, machine room-less lift (MRL); OR
      1.b.iii: A system strategy that is 'fit for purpose'.
   1.c: Consider the use of regenerative drives, subject to the requirements in Regenerative drives on the facing page.
   1.d: Specify the transport system with the lowest energy consumption.

Up to two credits - Energy efficient features
2. Achieve criterion 1.

One credit - Lifts
3. Specify the following three energy efficient features for each lift:
   3.a: A standby condition for off-peak periods.
   3.b: The lift car lighting and display lighting provides an average luminous efficacy across all fittings in the car of > 70 luminaire lumens per circuit Watt.
   3.c: Use of a drive controller capable of variable speed, variable-voltage, and variable-frequency (VVVF) control of the drive motor.
4. Specify regenerative drives where their use is demonstrated to save energy.

One credit - Escalators or moving walks
5. Specify at least one of the following for each escalator or moving walk:
   5.a: A load-sensing device that synchronises motor output to passenger demand through a variable speed drive; OR
   5.b: A passenger-sensing device for automated operation (auto walk), so the escalator operates in auto start mode when there is no passenger demand.
Compliance notes

Compliance notes are located in Appendix G – Notes for compliance on page 18 for the consultation. These compliance notes will be available through the knowledge base when the scheme goes live.

Methodology

Scope of Ene 06 issue

The criteria relating to lifts do not apply to lifting platforms, wheelchair platform stairlifts or other similar facilities to aid persons with impaired mobility. However, any lifting device with a rated speed greater than 0.15m/s must be assessed, inclusive of goods, vehicle and passenger lifts. An excluded transport type that demonstrates compliance with the BREEAM criteria would be considered best practice for an energy efficient system (despite not being required for the purpose of awarding the available credits).

Transport analysis

The transport analysis can be in the form of a written statement justifying the lift selection for the following conditions: where a single lift is provided in a low rise building for the purpose of providing disabled access only; or where a goods lift is selected based on the size of the goods it is intended to carry.

Regenerative drives

A regenerative drive should only be considered where it produces an energy saving greater than the additional standby energy used to support the drives. Regenerative drives will typically be appropriate for lifts with high travel and high intensity use.

Building has no lifts, escalators or moving walks or has only one of the transport systems

This issue will not be assessed where a building contains no lifts, escalators or moving walks. Where only either lifts, escalators or moving walks are present, only one credit is available for the Energy efficient features credit. Where both lifts and escalators or moving walks are present, then two credits are available.

Extensions to existing buildings

If assessing a new extension to an existing building, lifts present in the existing building fall outside the Ene 06 scope and do not need to be assessed. The above applies only where the lifts are not being renewed or undergoing a major refurbishment.

Evidence

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Interim design stage</th>
<th>Final post-construction stage</th>
</tr>
</thead>
<tbody>
<tr>
<td>All</td>
<td>One or more of the appropriate evidence types listed in The BREEAM evidential requirements on page 38 can be used to demonstrate compliance with these criteria</td>
<td></td>
</tr>
</tbody>
</table>
Definitions

Auto start condition - escalators and moving walks
A condition when the escalator or moving walk is stationary and powered up and ready to start initiated bypass passenger detection (from BSEN ISO 25745-3:2015).

Idle condition
A condition when a lift is stationary at a floor following a run before the standby mode is entered (from BSEN ISO 25745-1:2012).

Lift car lighting
The level of lift car lighting is determined by the relevant standards. For example, BS EN 81-20:2014(147) requires at least 100 lux on the control devices and at 1 m above the floor at any point not less than 100 mm from any wall.

Machine room-less lift (MRL)
All equipment is contained in the lift well, not in a separate machine room.

Standby condition - lifts
A condition when a lift is stationary at a floor and may have reduced the power consumption to a lower level set for that particular lift (from BSEN ISO 25745-1:2012 (148)). For example, the power side of the lift controller and other operating equipment such as lift car lighting, user displays and ventilation fans switch off when the lift has been idle for a prescribed length of time. The period between when a lift was last used and when a standby condition is entered is defined in BSEN ISO 25745-1 as 5 minutes.

Additional information

BS EN ISO 25745 - Energy performance of lifts, escalators and moving walks
BS EN ISO 25745 consists of three parts, under the general title Energy performance of lifts, escalators and moving walks:
- Part 1: Energy measurement and verification
- Part 2: Energy calculation and classification for lifts (elevators)
- Part 3: Energy calculation and classification for escalators and moving walks.

In Part 1, it has been estimated that approximately 5% of a building’s total energy consumption can be attributed to the operation of lifts and a large proportion of this can be attributed to standby mode in many situations. BS EN ISO 25745 Parts 2 and 3 have been prepared in response to the rapidly increasing need to ensure and to support the efficient and effective use of energy, providing:

1. A method to estimate energy consumption on a daily and an annual basis for lifts, escalators and moving walks.
2. A method for energy classification of new, existing or modernised lifts, escalators and moving walks.
3. Guidelines for reducing energy consumption that can be used to support building environmental and energy classification systems.
Ene 07 Energy efficient laboratory systems

- Fully fitted
- Simple building
- Shell & core
- Shell only
- No Minimum standard

Aim

To encourage laboratory areas that are designed to minimise their operational energy consumption and associated CO₂ emissions.

Value

- Encourage effective communication between the client and the design team to identify the occupant requirements and performance criteria
- Reduced capital and operating costs as a result of appropriate sizing and specification of equipment and adoption of best practice design principles
- Ensure that energy efficiency measures do not affect the health and safety of the occupants.

Context

Laboratory facilities are required to comply with regulations and other standards for safety and various environmental conditions such as temperature and air quality. Compared to an office building, the average laboratory consumes ten times more energy per square foot, with some labs using as much as 100 times more energy[149].
Therefore, energy efficient measures can result in significantly reduced energy costs and waste, improved systems efficiency and long-term sustainability.

Assessment scope

<table>
<thead>
<tr>
<th></th>
<th>Fully fitted</th>
<th>Simple building</th>
<th>Shell and core</th>
<th>Shell only</th>
</tr>
</thead>
<tbody>
<tr>
<td>Applicable assessment criteria</td>
<td>All</td>
<td>None</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>Assessment type specific notes</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>None</td>
</tr>
</tbody>
</table>

This issue is applicable only to further education, higher education, offices with research and development areas and other buildings with research and development facilities that contain laboratory space and containment devices or areas. This issue is not applicable for school buildings (primary and secondary level).
Ene 07 Energy efficient laboratory systems

Assessment criteria

This issue is split into three parts:

- Prerequisite
- Design specification (1 credit)
- Best practice energy efficient measures (up to 4 credits) - building type dependent.

Prerequisite
1 Achieve Hea 03 Safe containment in laboratories: Criterion 1 on page cxxii

One credit - Design specification
2 Engage with the client during the preparation of the initial project brief (RIBA Stage 1 or equivalent) to determine occupant requirements and define laboratory performance criteria. Performance criteria will include, but not be limited to:
   2.a: Description of purpose
   2.b: Occupant or process activities
   2.c: Containment requirements and standards
   2.d: Air change rate requirements
   2.e: Ventilation system performance and efficiencies
   2.f: Heating and cooling requirements
   2.g: Interaction between systems
   2.h: Flexibility and adaptability of laboratory facilities.

3 Size the services system equipment (including ventilation supply and extract) correctly (see Definitions on page cxxiii).

4 Demonstrate the minimised energy demand of the laboratory facilities resulting from the achievement of the defined design performance criteria.

Laboratory containment devices and containment areas (criteria only applicable to buildings containing these facilities)
5 Specify fume cupboards and other containment devices in compliance with criteria 2 and 3 of issue Hea 03 Safe containment in laboratories on page cxx, as appropriate to the containment device specification.

6 For ducted fume cupboards specified:
   6.a: Demonstrate that the average design air flow rate is no greater than 0.16 m³/s per linear metre (internal width) of fume cupboard workspace.
   6.b: Measure the volume flow rate in the exhaust duct (at the boundary of the laboratory) to take account of reductions in (inward) volume flow rate from fume cupboard leakage.
6.c: Demonstrate that a reduction in air flow does not compromise the defined performance criteria and does not increase the health and safety risk to future building occupants.

**Up to four credits - Best practice energy efficient measures**

If the laboratory area accounts for at least 10% of the total building floor area (see Definitions on page ccxii):

7. Achieve criteria 1 to 6 on the previous page (or criteria 1 to 5 on the previous page where there are no ducted fume cupboards).

8. Design, specify and install laboratory plant and systems to promote energy efficiency. Demonstrate compliance with items in Table 31 below (see 8.a and 8.b below for credits available).

8.a: Up to 2 credits; laboratory areas (see Definitions on page ccxii) account for at least 10% (but less than 25%) of the total building floor area; OR

8.b: Up to 4 credits; laboratory areas account for 25% or more of the total building floor area.

9. Demonstrate by calculations or modelling that the chosen measures have a reasonably significant effect on the total energy consumption of the laboratory, i.e. 2% reduction or greater.

10. Demonstrate that the energy efficient measures specified do not compromise the defined performance criteria, and do not increase the health and safety risk to future building occupants.

**Table 31** Best practice energy efficient measures in laboratories

<table>
<thead>
<tr>
<th>Item description</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fume cupboard volume flow rates (further reduction)</td>
<td>0.5</td>
</tr>
<tr>
<td>An average design air flow rate of &lt; 0.12m³/s per linear metre (internal width) of fume cupboard workspace</td>
<td></td>
</tr>
<tr>
<td>Grouping or isolation of high filtration or ventilation activities</td>
<td>0.5</td>
</tr>
<tr>
<td>Minimisation of room air change rates and overall facility ventilation flows by grouping together or isolating activities and equipment with high filtration or ventilation requirements.</td>
<td></td>
</tr>
<tr>
<td>Energy recovery - heat</td>
<td>0.5</td>
</tr>
<tr>
<td>Heat recovery from exhaust air (where there is no risk of cross-contamination) or via refrigerant or water cooling systems.</td>
<td></td>
</tr>
<tr>
<td>Energy recovery - cooling</td>
<td>0.5</td>
</tr>
<tr>
<td>Cooling recovery via exhaust air heat exchangers (where there is no risk of cross-contamination) or via refrigerant or water cooling systems.</td>
<td></td>
</tr>
<tr>
<td>Grouping of cooling loads</td>
<td>0.5</td>
</tr>
<tr>
<td>Grouping of cooling loads to enable supply efficiencies and thermal transfer.</td>
<td></td>
</tr>
<tr>
<td>Free cooling</td>
<td>0.5</td>
</tr>
<tr>
<td>Specification of free cooling coils in chillers or dry air coolers related to laboratory-specific activities.</td>
<td></td>
</tr>
<tr>
<td>Load responsiveness</td>
<td>0.5</td>
</tr>
<tr>
<td>Effective matching of supply with demand through modularity, variable speed drives and pumps, and other mechanisms.</td>
<td></td>
</tr>
<tr>
<td>Clean rooms</td>
<td>0.5</td>
</tr>
<tr>
<td>Specification of particle monitoring systems, linked to airflow controls.</td>
<td></td>
</tr>
<tr>
<td>Diversity</td>
<td>0.5</td>
</tr>
<tr>
<td>Achievement of high levels of diversity in central plant sizing and laboratory duct sizing, where compatible with safety.</td>
<td></td>
</tr>
<tr>
<td>Room air changes rates</td>
<td>0.5</td>
</tr>
<tr>
<td>Reducing air change rates by matching ventilation airflows to environmental needs and demands of containment devices.</td>
<td></td>
</tr>
</tbody>
</table>
### Item description

<table>
<thead>
<tr>
<th>Fan power</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specification and achievement of best practice fan power figures (as shown below) for all air handling units, laboratory extract systems, local extract ventilation, containment area extracts (where applicable) and fume cupboard extracts (where applicable).</td>
<td>1</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Laboratory system</th>
<th>Best practice specific fan power (W/(L/s))</th>
</tr>
</thead>
<tbody>
<tr>
<td>General laboratory supply air handling unit (AHU) with heating and cooling</td>
<td>1.5</td>
</tr>
<tr>
<td>General laboratory extract systems</td>
<td>1.2</td>
</tr>
<tr>
<td>Laboratory local extract ventilation – ducted</td>
<td>1.0</td>
</tr>
<tr>
<td>Containment area extract, without high efficiency particulate absorption (HEPA) filtration</td>
<td>1.5</td>
</tr>
<tr>
<td>Containment area extract, with HEPA filtration</td>
<td>2.5</td>
</tr>
<tr>
<td>Fume cupboard extract</td>
<td>1.5</td>
</tr>
</tbody>
</table>

Only whole credits can be awarded in BREEAM. Therefore to achieve a credit for items with partial credits, the laboratory must comply with at least two of the items. In an instance where, for example, three and half credits are achieved this would need to be rounded down to three credits.

### Compliance notes

Compliance notes are located in Appendix G – Notes for compliance on page 18 for the consultation. These compliance notes will be available through the knowledge base when the scheme goes live.

### Methodology

### Applicable standards

The laboratory criteria within issue Hea 03 Safe containment in laboratories on page cxx and guidance within G9 Fume Cupboards in Schools (Building Bulletin 88 can be used for assessments in Northern Ireland) should be followed. Where containment devices present in a school or sixth form college assessment are of a specialist nature more typical of a commercial or research laboratory, BRE should be contacted for further guidance.

### Evidence

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Interim design stage</th>
<th>Final post-construction stage</th>
</tr>
</thead>
<tbody>
<tr>
<td>All</td>
<td>One or more of the appropriate evidence types listed in The BREEAM evidential requirements on page 38 can be used to demonstrate compliance with these criteria.</td>
<td></td>
</tr>
</tbody>
</table>
Definitions

Laboratory areas

Laboratory areas are defined as highly serviced (temperature, ventilation, humidity or containment controlled) spaces where physical, biological or chemical processing or testing is carried out. Such areas will have inherently high energy demands. In order to maintain controlled conditions to enable experiments and comply with health and safety standards, typically laboratories:

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

Therefore, for the purpose of assessing this BREEAM issue, the definition of laboratory areas excludes any laboratory support areas such as:

1. Write up or offices
2. Meeting rooms
3. Storage
4. Ancillary and other support areas with lower servicing requirements.

Teaching and other laboratories or workshops with a limited amount of fume cupboards or other containment devices or no energy intensive process equipment specified are excluded, unless the design team can provide evidence that their consumption is at least 50% higher than a typical office due to the laboratory process-related activities. Benchmarks for general offices can be found in Table 1 in CIBSE TM46(150) Energy benchmarks.

Typically, in buildings where 40% of the floor area is laboratory related, only 10% will actually constitute laboratory areas as per the BREEAM definition. Different types of laboratories have different requirements for heating, ventilation and air-conditioning, plug load equipment and access. This can lead to enormous variations in energy and water requirements. The main types of laboratories include:

1. Wet laboratories - where chemicals, drugs or other material or biological matter are tested and analysed requiring water, direct ventilation and specialised piped utilities. They typically include chemical science laboratories. These laboratories require specially designed facilities.
2. Dry laboratories - contain dry stored materials, electronics, or large instruments with few piped services. They typically include engineering or analytical laboratories that may require accurate temperature and humidity control, dust control, and clean power.
3. Microbiological or clinical laboratories - often involve working with infectious agents. They typically require higher levels of primary containment and multiple secondary barriers including specialised ventilation systems to ensure directional air flow, air treatment systems to decontaminate or remove agents from exhaust air, controlled access zones, airlocks as laboratory entrances, or separate buildings or modules to isolate the laboratory.
4. In vivo laboratories - these require highly controlled environments for the care and maintenance of flora and fauna. The facilities are complex, expensive to build and to operate. Tight environmental control over the facility is required to avoid the introduction of contaminants or pathogens, prevent the possibility of infectious outbreaks, and avoid the transmission of odours.
5. Teaching laboratories - unique to academic institutes, they require space for teaching equipment, storage space for student belongings and less instrumentation than research labs.
6. Clean rooms - refers to a controlled environment (air quality, temperature and humidity) which prevent contamination and the regulating of environmental conditions, to facilitate accurate research and production needs. They are typically used in UK universities for nanotechnology, medical and pharmaceutical research or studies and microelectronics applications.
Right-sizing

Right-sizing principles encourage the use of better estimates in equipment loads from which services equipment is sized in comparison to traditional methods of estimates based on 'rated' data obtained from manufacturers' literature or design assumptions from previous projects. This can result in construction cost savings in addition to life cycle cost benefits, while taking account of the need for appropriate contingency.

Additional information

Synergy with BREEAM issue Ene 01 Reduction of energy use and carbon emissions

This BREEAM issue has been developed to recognise improvements made to new laboratory areas or buildings that are not currently fully recognised in the National Calculation Methodology, which is used to assess and award credits in Ene 01 Reduction of energy use and carbon emissions on page clx.
Ene 08 Energy efficient equipment

Fully fitted  Simple building  Shell & core  Shell only  No Minimum standard

Aim

To encourage installation of energy efficient equipment to ensure optimum performance and energy savings in operation.

Value

– Reduce unregulated energy consumption loads based on the building’s usage and occupants patterns
– Promote a better understanding of unregulated energy consumption for the significantly consuming systems, therefore reducing the performance gap

Context

The current building regulations do not account for all energy uses in buildings and aim to address regulated energy consumption. Unregulated sources of energy consumption such as swimming pools, server rooms, commercial and domestic scale appliances, are rarely considered and modelled at the design stage. However, they
can have significant impact on the energy use. In an office building for instance, they typically account for more than 30% of the energy consumption\(^\text{(151)}\). It is important to encourage solutions that result in unregulated energy reduction, which is variable between different building types and ignored by current regulatory standards.

### Assessment scope

<table>
<thead>
<tr>
<th>Applicable assessment criteria</th>
<th>Fully fitted</th>
<th>Simple building</th>
<th>Shell and core</th>
<th>Shell only</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assessment type specific notes</td>
<td>None</td>
<td>See ref. 1.0</td>
<td>None</td>
<td>None</td>
</tr>
</tbody>
</table>

Domestic scale appliances (individual and communal facilities) on page ccxvii item 5b is only applicable to multi-residential assessments.

<table>
<thead>
<tr>
<th>Assessment type specific</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.0 Ene 08 Energy efficient equipment: Criterion 1 on page ccxvi and 2: Ref A swimming are not applicable. All other criteria relevant to the building type and function apply.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Building type specific</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.0 Healthcare</td>
</tr>
<tr>
<td>All medical equipment can be exempted from complying with the criteria.</td>
</tr>
</tbody>
</table>
Ene 08 Energy efficient equipment

Assessment criteria

Two credits
1. Identify the building's unregulated energy consuming loads. Estimate their contribution to the total annual unregulated energy consumption of the building, assuming a typical or standard specification.
2. Identify the systems or processes that use a significant proportion of the total annual unregulated energy consumption of the building.
3. Demonstrate a meaningful reduction in the total annual unregulated energy consumption of the building. See below for unregulated energy consumption. If none of the examples listed in the table will be specified in the assessed building, the design team should justify how a meaningful reduction will be achieved.

Table 32 Examples of significant contributors to unregulated energy consumption, for a number of different building types or functions, and the solutions deemed to comply.

<table>
<thead>
<tr>
<th>Swimming pool</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Specify automatic or semi-automatic pool covers, or 'liquid' pool covers with an automatic dosing system to all pools, including spa pools and hot tubs.</td>
</tr>
<tr>
<td>2. The covers envelop the entire pool surface when fully extended.</td>
</tr>
<tr>
<td>3. Control the air temperature in the pool hall so that it is 1°C above the water temperature.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Laundry facilities with commercial-sized appliances</th>
</tr>
</thead>
<tbody>
<tr>
<td>Demonstrate at least one of the following for commercial-sized appliances:</td>
</tr>
<tr>
<td>1. Specification of heat recovery from waste water</td>
</tr>
<tr>
<td>2. Use of greywater for part of the washing process. This may be recycled from the final rinse and used for the next pre-wash.</td>
</tr>
<tr>
<td>3. The commercial or industrial sized machines are identified as eligible for the UK’s Enhanced Capital Allowance Scheme for water.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Data centres</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Design is in accordance with the 'Best practices for the EU Code of Conduct on Data Centres' principles with the data centre achieving at least the 'Expected minimum practice' level (as defined in the Code of Conduct).</td>
</tr>
<tr>
<td>2. Temperature set points are not less than 24°C, as measured at the inlet of the equipment in the rack.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>IT-intensive operating areas</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Specify a natural ventilation and cooling strategy as standard. Use forced ventilation only when the internal temperature exceeds 20°C and active cooling only when the internal temperature exceeds 22°C.</td>
</tr>
<tr>
<td>2. Specify a mechanism to achieve automatic power-down of equipment when not in-use, including overnight.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Domestic scale appliances (individual and communal facilities)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Any white goods, available to purchase from the developer, must achieve the following ratings (or better) under the EU Energy Efficiency Labelling Scheme:</td>
</tr>
<tr>
<td>1. Fridges, fridge-freezers: A+ rating</td>
</tr>
<tr>
<td>2. Washing machines: A++ rating</td>
</tr>
<tr>
<td>3. Dishwashers: A+ rating</td>
</tr>
</tbody>
</table>
4. Washer-dryers: A rating
5. Tumble dryers:
   a. A rating OR
   b. For multi-residential assessments only, provide an adequate internal or external space capable of holding drying lines as specified in the Drying lines section.

**Healthcare**

Carry out a life cycle costing analysis for at least two options in accordance with HTM07-02, Part B, Chapter 1 (154). Inform and specify large-scale equipment (where present, see Definitions on page cxxv) and sets of electrical equipment (where numbering more than 50) based on the life cycle costing analysis.

**Kitchen and catering facilities**

Incorporate at least two-thirds of the energy efficiency measures outlined in the 'section summary' boxes of each of the following sections of CIBSE Guide TM50 (155) (except as specified):
1. Section 8 - Drainage and kitchen waste removal
2. Section 9 - Energy controls - specifically controls relevant to appliances
3. Section 11 - Appliance specification - excluding fabrication or utensil specifications
4. Section 12 - Refrigeration
5. Section 13 - Warewashing; dishwashers and glasswashers
6. Section 14 - Cooking appliance selection
7. Section 15 - Water temperatures, taps, faucets and water saving controls

Refrigeration (see Refrigeration equipment on the facing page) for kitchen and catering facilities should be assessed here, not in EnE 05 Energy efficient cold storage on page cxcvii

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**Compliance notes**

**Methodology**

**Estimating annual unregulated energy consumption**

A method should be used that estimates actual energy use, based on expected equipment loads and hours of operation. The energy uses may be estimated by using simple hand calculations, benchmark data or by the methods described in CIBSE TM54: Evaluating operational energy performance of buildings at the design stage (156).

**Estimating a significant proportion of annual unregulated energy consumption**

This methodology is used to estimate which energy uses make up a significant proportion of the unregulated energy uses and so detailed calculations are not required. The approach should focus on identifying the larger energy uses that should be included and the small energy uses that can be excluded. As a guide, energy uses making up at least 90% of the estimated total annual energy consumption should typically be included (this is a statutory requirement in Wales, Northern Ireland and England – see EnE 02 Energy monitoring Additional information on page cxxviii).

**A meaningful reduction in unregulated energy demand**

BREEAM does not specify a level or percentage that defines a meaningful reduction in unregulated energy demand.
The project team must justify how they have determined or judged a meaningful reduction from the unregulated energy demand and the assessor must be satisfied that this is an appropriate justification.

**Domestic scale appliances**

**Drying lines**
Domestic scale appliances (individual and communal facilities) requires the provision of an adequate internal or external secure space with posts and footings, or fixings capable of holding:

1. For self-contained dwellings:
   a. One to two bedrooms: 4m+ of drying line.
   b. Three or more bedrooms: 6m+ of drying line.
2. For individual bedrooms:
   a. Two metres or more of drying line per bedroom for developments with up to 30 individual bedrooms; plus
   b. One metre of additional drying line for each bedroom over the 30 individual bedroom threshold.

This issue does not apply to multi-residential assessments of supported living facilities (for safety reasons, to minimise ligature risk to particular residents). It is also not applicable to projects where occupancy is transient, such as hotel- or hostel-type developments, but does apply to long term residential buildings.

**Adequate internal space**
A heated space with adequate, controlled ventilation, complying with the national building regulations relevant to the location of the building (rooms that commonly meet these requirements are a bathroom or utility room);

OR
An unheated outbuilding, where calculations by an appropriate Member of the Chartered Institute of Building Services Engineers (CIBSE) or an equivalent professional demonstrate that ventilation in the space is adequate to allow drying in normal climatic conditions and to prevent condensation and mould growth. The fixing or fitting needs to be a permanent feature of the room. Internal drying spaces in the following rooms do not comply:

1. Living rooms
2. Kitchens
3. Dining rooms
4. Main halls
5. Bedrooms.

**Excluded building types**
This criterion does not apply to multi-residential assessments of supported living facilities (for safety reasons, to minimise ligature risk to particular residents). It is also not applicable to projects where occupancy is transient, such as hotel or hostel-type developments, but does apply to long term residential buildings.

**Refrigeration equipment**

Section 12 - Refrigeration and [Kitchen and catering facilities on the previous page](#) apply to the following refrigeration equipment (where present):

1. Air-cooled condensing units
2. Cellar cooling
3. Commercial service cabinets
4. Curtains or blinds for refrigerated display cabinets
5. Refrigeration compressors
6. Refrigeration system controls
7. Refrigerated display cabinets.
Cold storage

The criteria do apply to commercial kitchen refrigeration but not to other commercial or industrial sized refrigeration and storage systems. These systems are covered within the scope of Ene 05 Energy efficient cold storage on page cxcvi and should be removed from the list of unregulated loads with respect to this issue.

Lifts, escalators and moving walks

This issue does not apply to lifts, escalators and moving walkways. These systems are covered within the scope of Ene 06 Energy efficient transport systems on page ccii and should be removed from the list of unregulated loads with respect to this issue.

Laboratory systems

This issue does not apply to laboratory ducted fume cupboards. These systems are covered within the scope of Ene 07 Energy efficient laboratory systems on page ccvi and should be removed from the list of unregulated loads with respect to this issue.

Reuse of equipment

Reuse of electrical equipment does not comply by default, as it may not be the most energy efficient option. However, the credit could be awarded if either of the following criteria are demonstrated:

1. The existing electrical appliances meet the criteria for inclusion on the Enhanced Capital Allowance Scheme Energy Technology Product List\(^{(157)}\).
2. Reusing the old equipment would, over the course of its life, be a more energy efficient option than specifying new equipment.

No specified systems contributing to the unregulated energy demand

Where there are no systems specified contributing to the unregulated energy load of the building, Ene 08 issue will be filtered out.

Evidence

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Interim design stage</th>
<th>Final post-construction stage</th>
</tr>
</thead>
<tbody>
<tr>
<td>All</td>
<td>One or more of the appropriate evidence types listed in The BREAM evidential requirements on page 38 can be used to demonstrate compliance with these criteria.</td>
<td></td>
</tr>
</tbody>
</table>

Definitions

**Data centre**

For the purpose of this BREEAM issue, the term 'data centres' includes all buildings, facilities and rooms which contain enterprise servers, server communication equipment, cooling equipment and power equipment, and may provide some form of data service (e.g. large-scale mission critical facilities all the way down to small server rooms located in office buildings).
Healthcare large-scale equipment
This includes commercial-scale catering and laundry equipment and all other equipment with connected electrical loads in excess of 10kW rated input power.

IT-intensive areas
These include computer areas where more than one computer per 5m² is provided, e.g. training suites, design studios, libraries’ IT areas and other areas with a high density of computing devices.

Regulated energy
Building energy consumption resulting from the specification of a controlled, fixed building services and fittings, including space heating and cooling, hot water, ventilation and lighting.

Secure space
For self-contained dwellings this can be defined as an enclosed space only accessible to the residents of the dwelling. For buildings with a communal drying space it is an enclosed space with a secure entrance, accessible to the residents of the building only.

Unregulated energy
Building energy consumption resulting from a system or process that is not ‘controlled’, i.e. energy consumption from systems in the building on which the building regulations do not impose a requirement. This may include energy consumption from operational-related equipment, e.g. computers, servers, printers, laptops, mobile fume cupboards, cooking, audio-visual equipment and other appliances etc.
Unlike the definition for Ene 01 Reduction of energy use and carbon emissions, for this issue, it does not include energy consumption from systems integral to the building and its operation, e.g. commercial or industrial refrigeration systems; lifts, escalators and other transport systems; and ducted fume cupboards; because they are already assessed separately in issues Ene 05, Ene 06 and Ene 07 respectively.

White goods
Domestic appliances for example washing machines, fridges, freezers, fridge-freezers, tumble dryers, washer-dryers.

Additional information

Ventilation - Building regulations
See Domestic scale appliances (individual and communal facilities) item 5b
The following lists the building regulations relevant for the assessment of this issue specific to the country of the UK:
- Wales - Approved Document F Ventilation 2010 (England and Wales)
- Scotland - Technical Handbook 2016 - Domestic Section 3 Environment
- Northern Ireland - Technical Booklet K Ventilation 2012
## Transport

- **Fully fitted**: 10%
- **Simple building**: 9
- **Shell & core**: 12
- **Shell only**: 14.5

### Summary

This category encourages provision of and improved access to local amenities and to sustainable means of transport, i.e. public transport and other alternative transport solutions for building users. The aim is to reward locations and solutions that support reductions in car journeys and, therefore, congestion and CO₂ emissions over the life of the building.

**Tra 01 Public transport accessibility**  
Up to 5 credits

- Recognition for developments in proximity to good public transport networks, thereby helping to reduce transport-related pollution and congestion.

**Tra 02 Proximity to amenities**  
Up to 2 credits

- Recognition of developments in close proximity of, and accessible to, local amenities which are likely to be frequently required and used by building occupants.

**Tra 03 Alternative modes of transport**  
Up to 2 credits

- Provision of facilities to encourage travel using low carbon modes of transport and to minimise individual journeys.

**Tra 04 Maximum car parking capacity**  
Up to 2 credits

- Recognition of developments that limit car parking capacity.

**Tra 05 Travel plan**  
1 credit

- To promote sustainable reductions in transport burdens by undertaking a site-specific travel assessment or statement and developing a travel plan based on the needs of the particular site.
Tra 01 Public transport accessibility

Aim

To reduce the impacts of transport-related pollution and congestion by promoting the provision and use of public transport.

Value

- Promotes the use of public transport
- Promotes the provision of bus services tailored to the use of the building
- Reduces building users' carbon footprint and associated negative environmental impacts, improving local air quality and reducing local congestion

Context

Transport accounts for around a quarter of UK greenhouse gas emissions, significantly affecting air quality at the roadside\(^\text{(158)}\). Public transport offers a route to addressing transport-related greenhouse gas emissions and will contribute towards the UK's long term goal of reducing greenhouse gas emissions by at least 80%, compared to 1990 levels by 2050. The emissions from trains and buses can be up to eight times lower than car travel\(^\text{(159)}\).
Furthermore we have all experienced poor access to public transport and traffic congestion, adding in some cases, hours onto our travel times.

It is not only important to have capacity in our public transport, but also to ensure that the public transport is accessible for all and operates at convenient times to meet our needs. The National Planning Policy Framework places significant emphasis on sustainable transport options, stating that planning should “make the fullest possible use of public transport, walking and cycling, and focus significant development in locations which are or can be made sustainable”[160].

By reducing air pollution levels, the burden of disease from stroke, heart disease, lung cancer and both chronic and acute respiratory diseases, including asthma, can be lessen.

Air pollution is estimated to cause 29,000 deaths each year and to reduce the life expectancy by 6 months on average in the UK, at a cost of £16 billion per year.

It also damages plants and animals, affecting biodiversity and crop yields[161].

While the role of strategic policies is key, the need to address this issues with careful planning and design remains key to the creation of urban environments that are healthier and more pleasant to live.

### Assessment scope

<table>
<thead>
<tr>
<th>Applicable Assessment criteria</th>
<th>Fully fitted</th>
<th>Simple building</th>
<th>Shell and core</th>
<th>Shell only</th>
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<tr>
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<td>None</td>
<td>None</td>
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</tbody>
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<table>
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</thead>
<tbody>
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</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Building type specific</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
</tr>
</tbody>
</table>
**Tra 01 Public transport accessibility**

**Assessment criteria**

This issue is split into two parts:

- Accessibility Index, (up to 5 credits - building type dependent)
- Dedicated bus service (1 credit)

One of the following is required to demonstrate compliance:

**Up to five credits - Accessibility Index**

1. Collate the following information to determine the public transport Accessibility Index (AI) of the assessed building (see Table 33)

   1.a: Distance (m) from the main building entrance to each compliant public transport node
   1.b: Public transport type serving the compliant node, e.g. bus or rail;
   1.c: Average number of services stopping per hour at each compliant node during the operating hours of the building for a typical day, (see Table 34).

2. Use the BREEAM Tra01 calculator to calculate the AI and determine the BREEAM credits for the assessed building.

**Table 33** Credits available for each building type relating to the public transport AI score.

<table>
<thead>
<tr>
<th>AI</th>
<th>2</th>
<th>4</th>
<th>8</th>
<th>10</th>
<th>12</th>
<th>18</th>
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</thead>
<tbody>
<tr>
<td>Building type</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Offices, Industrial, Multi-residential, Other building transport type 1</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Preschool, School, Sixth Form</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Retail, Law Court, Further Education College, Higher Education type 1, Other building transport type 2</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Higher Education type 2</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>-</td>
</tr>
<tr>
<td>Healthcare - Hospitals (Acute, Specialist, Teaching, Mental health)</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>3</td>
<td>4</td>
<td>5</td>
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<td>Healthcare - GP surgery, Health centre, Community hospital</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>-</td>
</tr>
<tr>
<td>Rural location sensitive buildings. Other building transport type 3</td>
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<td>2</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
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<tr>
<td>Prison site, MOD site</td>
<td>1</td>
<td>2</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Transport hub</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>

**Table 34** Default hours of operation by building type for a typical day

<table>
<thead>
<tr>
<th>Building type</th>
<th>Default hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Commercial</td>
<td>08.00–19.00</td>
</tr>
<tr>
<td>Preschool, school, sixth form college</td>
<td>07.30–10.00,15.00 - 17.30</td>
</tr>
<tr>
<td>Building type</td>
<td>Default hours</td>
</tr>
<tr>
<td>----------------------------------------</td>
<td>-------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Further &amp; Higher Education</td>
<td>08.00–19.00</td>
</tr>
<tr>
<td>Healthcare</td>
<td>07.00–20.00 (encompassing visiting hours and the typical daytime shift pattern)</td>
</tr>
<tr>
<td>Retail: Shopping centre</td>
<td>09.00–19.00</td>
</tr>
<tr>
<td>Retail: Supermarket</td>
<td>08.00–22.00</td>
</tr>
<tr>
<td>Retail: Service provider</td>
<td>08.00–18.00</td>
</tr>
<tr>
<td>Retail: Convenience store</td>
<td>07.00–22.00</td>
</tr>
<tr>
<td>Retail: DIY or retail park</td>
<td>08.00–20.00</td>
</tr>
<tr>
<td>Retail: shop</td>
<td>08.30–17.30</td>
</tr>
<tr>
<td>Multi-residential accommodation</td>
<td>08.00–19.00</td>
</tr>
<tr>
<td>Court</td>
<td>08.00–19.00</td>
</tr>
<tr>
<td>Prison</td>
<td>07.00–20.00 (encompassing visiting hours and the typical daytime shift pattern)</td>
</tr>
<tr>
<td>Other Buildings</td>
<td>08.00–19.00</td>
</tr>
<tr>
<td>24-hour-use building</td>
<td>07.00–20.00</td>
</tr>
</tbody>
</table>

OR

**One credit - Dedicated bus service**

This credit is only available if a development has not achieved any of the Accessibility Index credits due to the low public transport AI of its location.

3 For buildings with a fixed shift pattern, where users will predominantly arrive or depart at set times, e.g. schools, offices, retail, factories, prisons etc., the building occupier commits to providing a dedicated bus service to and from the building at the beginning and end of each shift or day.

**Compliance notes**

Compliance notes are located in Appendix G – Notes for compliance on page 18 for the consultation. These compliance notes will be available through the knowledge base when the scheme goes live.

**Methodology**

The methodology for calculating the AI uses Transport for London’s Public Transport Accessibility Level (PTAL) method, itself based on a methodology developed in 1992 by the London Borough of Hammersmith and Fulham. For a detailed description of the PTAL methodology see the 'Assessing transport connectivity in London' document.

**Calculating the average number of services**

For the purpose of the calculation, the frequency of public transport is the average number of services per hour. This is calculated by determining the number of stopping services at the node during the peak arrival and departure times for the building or the building’s typical day’s operating hours (see definition ‘operating hours’), divided by the number of hours within that period. For example: the average number of services for an assessment of a building that operates between 08.00–19.00 hrs (11 hours) and is within proximity of a bus stop with 35 stopping services during this period is 3.2 (equivalent to an average service frequency of approximately 20 minutes).
Multiple services
Services that operate from more than one node within proximity of the building, i.e. two separate bus stops served by the same bus, must be considered only once - at the node in closest proximity to the building. Different services at the same node can be considered as separate.

Bi-directional routes
Routes will be bi-directional; however for the purpose of calculating the index, consider only the direction with the highest frequency (in accordance with the PTAL methodology).

Campus or campus-style developments - entrance to consider when calculating the AI
The main entrance to the campus, e.g. further or higher education sites, can be used to determine the distance to a compliant node, if 80% or more of the buildings are within 1000m of this entrance.
If the site has more than one main entrance, either entrance can be used for the calculation.
Where less than 80% of the buildings are within 1000m of the campus' main entrance, the assessed building's main entrance must be used to determine the distance to a compliant node. This aims to encourage the location of public transport nodes inside or on the periphery of the campuses.

Buildings in Greater London
The Transport for London Planning Information Database allows users to search for a specific London location by street name, coordinates or postcode and then calculate the Accessibility Index (AI) for that location. The Total AI is confirmed for the Point of Interest (POI) within the summary report, which can be downloaded and used as evidence of compliance for the assessed building. Go to tfl.gov.uk

Dedicated bus services
The dedicated bus must provide transfer to the local population centre, public transport interchange or be a door-to-door service. The service can be included in the public transport Accessibility Index calculation as a public transport service, in which cases, the ‘dedicated bus service’ credit cannot be awarded and the distance from the main building entrance to the transport node should be to the drop-off or pick-up point of the service.

Phased developments
New transport facilities provided at a later stage, as part of a large phased development, can be deemed to meet the requirements on condition that:
A commitment has been made within the General Contract Specification or in the form of a Section 106 Agreement, to provide transport facilities within the shortest of the following periods:

1. The transport facilities will be available for use by the time 25% of all phases have been completed and are ready for occupation. OR
2. The transport facilities will be available for use within 25% of the total build time for the phase in which the assessed building forms a part, measured from the completion date of that phase.

Where the transport facilities will not be available for use within a period of five years from occupation of the building, they cannot be considered for determining compliance with the BREEAM criteria.
Evidence

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Interim design stage</th>
<th>Final post-construction stage</th>
</tr>
</thead>
<tbody>
<tr>
<td>All</td>
<td>One or more of the appropriate evidence types listed in the BREEM evidential</td>
<td></td>
</tr>
<tr>
<td></td>
<td>requirements on page 38 can be used to demonstrate compliance with these criteria.</td>
<td></td>
</tr>
<tr>
<td>Table 33, 2</td>
<td>A completed copy of the Tra 01 calculator</td>
<td>As per interim design stage</td>
</tr>
<tr>
<td>Table 33, 2</td>
<td>Documentary evidence supporting the data used to complete the Calculator tool.</td>
<td>As per interim design stage</td>
</tr>
<tr>
<td></td>
<td>For developments in Greater London where a Public Transport Accessibility Level (PTAL) report is provided, additional evidence to demonstrate compliance with criteria 1 and 2 is not required. The assessor must be satisfied that the PTAL report is current and accurately relates to the assessed site.</td>
<td></td>
</tr>
</tbody>
</table>

Definitions

Accessibility index (AI)

An indicator of the accessibility and density of the public transport network at a point of interest (in the case of BREEM, a building). The index is influenced by the proximity and diversity of the public transport network and the level or frequency of service at the accessible node. For example, a building that has a single public transport node 500m from its main building entrance with one service stopping every 15 minutes, i.e. four services per hour on average, will score an AI of approximately 1.90. Alternatively, the same node with one service every 15 minutes, but 300m from the building entrance will achieve an AI of 2.26. The same node with two services stopping every 15 minutes will score an AI of 2.85. The greater the number of compliant nodes, services and their proximity to the building, the higher the AI.

An indicator of the accessibility and density of the public transport network at a point of interest (in the case of BREEM, a building). The index is influenced by the proximity and diversity of the public transport network and the level or frequency of service at the accessible node. For example, a building that has a single public transport node 500m from its main building entrance with one service stopping every 15 minutes, i.e. four services per hour on average, will score an AI of approximately 1.90. Alternatively, the same node with one service every 15 minutes, but 300m from the building entrance will achieve an AI of 2.26. The same node with two services stopping every 15 minutes will score an AI of 2.85. The greater the number of compliant nodes, services and their proximity to the building, the higher the AI.

Additional building type classifications

Higher Education transport type 1: H.E. buildings located on a campus where less than 25% of students are resident on the campus or within 1 km radius from the campus' main entrance.
Higher Education transport type 2: H.E. buildings located on a campus where 25% or more of the students are resident on the campus or within 1 km radius from the campus' main entrance.

Other Building transport type 1: A building predominantly occupied by staff or employees with occasional business related visitors.

Other Building transport type 2: A building occupied by a number of core staff or employees with a larger number of consistently frequent visitors or users (either resident or non-resident).

Other Building transport type 3: As type 2, but building types specifically required to be located rurally as a result of its function, i.e. a building which would never be located within an urban area, e.g. a National Park visitor centre (see definition of rural and rural location sensitive buildings location).

Compliant transport node
A compliant node includes any bus service with a stop within 650m and any railway station within 1000m of the assessed building’s main entrance, measured via a safe pedestrian route (not 'as the crow flies'). The service stopping at each node must provide transport from, or onward travel to, either an urban centre, major transport node or a community focal point, e.g. doctor's surgery, library, school or village centre. Only local services should be assessed and any national public transport services should be excluded from the analysis, unless such a service can be said to provide a local commuter service.

Prisons and MOD sites: The distance requirement for a compliant node for buildings on these sites is 1000m for both bus and rail.

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 and is available to the majority 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. building with a boundary on a public highway). For prison or MOD site assessments, the main entrance should be taken as the gatehouse entrance.

Operating hours
BREEAM seeks to define the building’s accessibility to the public transport network for the period during which the majority of building users will travel to and from the building. In most cases the normal operating hours of the building can be used. Where shift patterns see the majority of building users (over 80%) arriving or leaving during a certain period, for example an office building where the majority of office workers arrive between 8.00-10.00, that period can be used as an alternative to the operating hours of the building. This accounts for some building types that operate a 24 hour day and on a shift work basis. During what typically would be deemed unsociable hours, and therefore periods where there is little if any public transport operating, such periods are not required to be accounted for in the assessment of this issue. Where the assessed building operates on a 24-hour basis or the operating hours are unknown at the time of assessment, then refer to and use the table of default operating hours, which can be found in the additional information section of this issue.

BREEAM Tra 01 Calculator tool
A spreadsheet-based calculator used to determine the Al for the assessed building and the number of BREEAM credits achieved.

Rural location
A rural location is defined in this context as a site clearly not within or on the boundary of a small, medium or large urban cover. An urban cover will have a population of 3000 people or more, located within a tract of continuously built-up urban land extending 20 hectares or more. Therefore, the definition of rural includes village...
locations, green field sites or small urban centres with a population of less 3000 people within a tract of land no greater than 20 hectares. Such locations will most likely be on a local bus route to larger urban areas or other local towns and may have local shops and other facilities. This classification is based on the Department of Transport National Travel Survey definition, which specifies urban areas based on the extent of urban development indicated on Ordnance Survey maps.

Rural location sensitive buildings
This definition includes any of the building types (listed below) where there is a demonstrable social or economic need from a rural population for the service and demand, which the new building is intended to meet; and therefore locating the building at an alternative site which could have higher public transport accessibility levels, i.e. within an urbanised area, is unfeasible. The following building types are examples of those that may fall into this category.

1. Offices where providing services to the local community
2. Industrial where providing services to the local community
3. Retail where providing services to the local community
4. Preschool, primary and secondary school
5. GP surgery

Typical day
The typical day is that which represents the period when travel to and from the building by its users and visitors will be at its highest. For most buildings this should be taken as a mid-week 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 (excluding Sundays).

Additional information

None.
Tra 02 Proximity to amenities

Aim

To reward a building location and design solutions that facilitate easy access to local services, in this way helping to avoid unnecessary environmental, social and economic impacts of longer building user journeys.

Value

- Helps to reduce the need for travel, reducing building users’ carbon footprint, travelling time and costs
- Improves health and wellbeing by encouraging use of more active means of travel, reducing staff down time and costs to society, i.e. sickness and health costs, etc
- Enhances the viability of local services and amenities, which benefit both business and community more generally
- Enhances attractiveness to tenants and occupants, hence staff recruitment and retention benefits, etc
- Promotes community cohesion, engagement and sense of place

Context

The growing focus on out of edge of town developments in the commercial and retail sectors especially, is increasing the dependency on private travel point. This fragments the provision of local services and amenities, resulting in a significant increase in short distance travel, often by private transport.
New developments have the potential to enhance the viability of local services and amenities that benefit both businesses and the wider community or society.

Assessment scope

<table>
<thead>
<tr>
<th></th>
<th>Fully fitted</th>
<th>Simple building</th>
<th>Shell and core</th>
<th>Shell only</th>
</tr>
</thead>
<tbody>
<tr>
<td>Applicable Assessment criteria</td>
<td>All</td>
<td>All</td>
<td>All</td>
<td>All</td>
</tr>
<tr>
<td>Assessment type specific notes</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>None</td>
</tr>
</tbody>
</table>

Assessment specific

- None

Building type specific

- None
Tra 02 Proximity to amenities

Assessment criteria

Up to two credits

With reference to the criteria in Table 35 below:

1. All Building Groups (BG), apart from BG 6, are located within the stated proximity of at least two core (C) amenities.

2. Meet the remaining number of amenities required using any other applicable or core amenities.

Table 35 Criteria and credits for different building groups

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Building Groups</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of BREEAM credits</td>
<td>BG 1</td>
</tr>
<tr>
<td>No. of amenities required</td>
<td>1</td>
</tr>
<tr>
<td>Proximity (metres)</td>
<td>500</td>
</tr>
<tr>
<td>Appropriate food outlet</td>
<td>C</td>
</tr>
<tr>
<td>Access to cash</td>
<td>C</td>
</tr>
<tr>
<td>Access to an outdoor open space (public or private, suitably sized and accessible to building users)</td>
<td>✔</td>
</tr>
<tr>
<td>Access to a recreation or leisure facility for fitness or sports</td>
<td>C</td>
</tr>
<tr>
<td>Publicly available postal facility</td>
<td>✔</td>
</tr>
<tr>
<td>Community facility</td>
<td>✔</td>
</tr>
<tr>
<td>Over the counter services associated with a pharmacy</td>
<td>✔</td>
</tr>
<tr>
<td>Public sector GP surgery or general medical centre</td>
<td>✔</td>
</tr>
<tr>
<td>Child care facility or school</td>
<td>✔</td>
</tr>
</tbody>
</table>

Key:

✔ - Amenity relevant to building group.
C - Core amenity for building group

Building Types:

BG 1: Offices, Retail, Industrial, Courts
BG 2: Preschool, Schools, Sixth Form
BG 3: Higher Education and Further Education
BG 4: Healthcare
BG 5: Multi-residential (two credits are available and each can be awarded independently of the other).
BG 6: Other Building types

This issue is not applicable to prison buildings and developments.
Compliance notes

Compliance notes are located in Appendix G – Notes for compliance on page 18 for the consultation. These compliance notes will be available through the knowledge base when the scheme goes live.

Methodology

Campus or campus-style developments - entrance to consider

The main entrance to the campus, e.g. further or higher education sites, can be used to determine the distance to amenities, if 80% or more of the buildings are within 1000m of this entrance.

If the site has more than one main entrance, either entrance can be used for the calculation.

Where less than 80% of the buildings are within 1000m of the campus' main entrance, the assessed building’s main entrance must be used to determine the distance to a compliant node. This aims to encourage the location of public transport nodes inside or on the periphery of the campuses.

Evidence

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Interim design stage</th>
<th>Final post-construction stage</th>
</tr>
</thead>
<tbody>
<tr>
<td>All</td>
<td>One or more of the appropriate evidence types listed in The BREEAM evidential requirements on page 38 can be used to demonstrate compliance with these criteria</td>
<td></td>
</tr>
<tr>
<td>All</td>
<td>Where the amenities do not currently exist but are due to be developed a letter from the client or developer confirming: 1. The location and type of amenities to be provided 2. The timescale for development of the amenities.</td>
<td>As per interim design stage</td>
</tr>
</tbody>
</table>

Definitions

Accessible amenities

Amenities (as listed) that are accessible via safe pedestrian routes, e.g. pavements, paths and safe crossing points or, where provided, dedicated pedestrian crossing points. The distance should not be measured in a straight line, ‘as the crow flies’.

Appropriate food outlet

Access to a food supply that is affordable to the majority of the building users as well as being appropriate for their day-to-day needs. For example, a small office building with a small shop selling sandwiches or snacks, or a multi-residential building with a restaurant in the local area.
**Child care or school**
To provide child support for potential building users. For example, a nursery, child minding facilities or a school local to the development.

**Community facility**
An internal space that will facilitate community activities for the assessed building and its users. For example, for a multi-residential building this could be a community hall or, for an office building, a public house.

**Outdoor open space (public or private, suitably sized and accessible to building users)**
A space that enables building users to take a break from internal building activities. For example, an office building with space to sit outside for lunch. The space must be suitably sized for the building users associated with the project and not form part of the public highway.

**Recreation or leisure facility**
A facility that allows building users to exercise and maintain a healthy lifestyle. For example, a local leisure centre, tennis courts, an on-site gym or, for a school, a local playground.

---

**Additional information**

None.
Tra 03 Alternative modes of transport

Aim

To encourage the use of low carbon transport modes through the provision of facilities and support mechanisms.

Value

- Promotes improvement of the local cycling network and of public transport accessibility to the site
- Cost savings for building users, compared with maintaining and running a traditionally fuelled car
- Encourages active travel, improving people’s health and wellbeing
- Improves local air quality by encouraging clean travel and reducing reliance on traditionally fuelled car and individuals’ car journeys (i.e. electric cars, cycling etc.)

Context

Provision of alternative sustainable transport options can play a critical role in allowing people to travel around their local area while reducing associated congestion, carbon emissions and improving air quality. The government is encouraging alternative means of sustainable transport. The Cycling Delivery Plan and the provision of grants for ‘plug in cars’ are examples of this. Statistics published by the Department for Transport showed that 5% of people were considering buying an electric car or van. We need to ensure that the infrastructure is there to support people in making the move to alternative sustainable transport.
### Assessment scope

<table>
<thead>
<tr>
<th></th>
<th>Fully fitted</th>
<th>Simple building</th>
<th>Shell and core</th>
<th>Shell only</th>
</tr>
</thead>
<tbody>
<tr>
<td>Applicable Assessment criteria</td>
<td>All</td>
<td>All</td>
<td>All</td>
<td>All</td>
</tr>
<tr>
<td>Assessment type specific notes</td>
<td>None</td>
<td>None</td>
<td>See ref. 1.0</td>
<td>See ref. 1.0</td>
</tr>
</tbody>
</table>

#### Assessment type specific

**1.0**  
**Cycle storage and cyclists facilities credit (option 5)**

The compliant number of cycle storage spaces must be provided as part of the base build. Compliant cyclists' facilities (showers, changing areas etc.) can also be provided in shell and core areas of the building as part of the base build. Alternatively, compliance can be demonstrated where the shell and core building is designed to facilitate future installation of the compliant number and type of cyclists' facilities by the tenant or owner-occupier through the provision of an appropriately sized and dedicated space in the base building, including either the installation of the appropriate services (for showers) or infrastructure to allow the future installation of the relevant services, e.g. capped water supply, service or ventilation ducts, drainage etc.

#### Building type specific

**2.0**  
**Education (schools only)**  
In a preschool or primary school, shower provision is for staff only and set at a rate of one shower for every 10 cycle storage spaces provided (subject to a minimum of one shower). For example, a primary school designed to accommodate three classes per year requires a total of 15 compliant cycle storage spaces, and therefore two showers for staff use.

**2.1**  
**Education (secondary schools only)**  
In a secondary school, for cyclists facilities, compliance for students can be based on the provision of compliant lockers only. Students are not expected to have access to private showers in relation to cyclists' facilities. For staff, the number of cyclists' facilities is based on the total number of staff, as per the criteria.

**2.2**  
**Education (schools only)**  
In a preschool or primary school, shower provision is for staff only and set at a rate of one shower for every 10 cycle storage spaces provided (subject to a minimum of one shower). For example, a primary school designed to accommodate three classes per year requires a total of 15 compliant cycle storage spaces, and therefore two showers for staff use.

**2.3**  
**Secure accommodation**  
For a secure accommodation unit, compliance should be based on visitors (not beds).
A

Tra 03 Alternative modes of transport

Assessment criteria

1. Implement one of the options in Table 36 below.

Table 36 Criteria and credits for alternative modes of transport

<table>
<thead>
<tr>
<th>x</th>
<th>Applicable building types</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>All</td>
<td>2</td>
</tr>
</tbody>
</table>
|   | 1. During preparation of the brief, the design team consults with the local authority on the state of the local cycling network and how the development could improve it;  
   2. Agree and implement one proposition chosen with the local authority. The proposition supported by the development is additional to existing local plans and has a significant positive impact on the local cycling network. |         |
| 2 | All                       | 2       |
|   | 3. Negotiate with local bus companies an increase in the local service provision for the development;  
   4. Increase the existing AI by at least 1.00 (see Tra 01 Public transport accessibility). |         |
| 3 | All                       | 2       |
|   | 5. Provide electric recharging stations for at least 3% of the total car parking capacity for the development;  
   6. Demonstrate electric vehicles using charging points have lower CO₂ emissions than petrol or diesel counterparts. |         |
| 4 | All                       | 2       |
|   | 7. Set up a car sharing group or facility to facilitate and encourage building users to car share;  
   8. Raise awareness of the sharing scheme with marketing and communication materials;  
   9. Provide priority spaces for car sharers for at least 5% of the total car parking capacity for the development;  
   10. Locate priority parking spaces nearest the development entrance used by the sharing scheme participants. |         |
| 5a| All (excluding sheltered, care homes, supported living facilities and prison building types) | 1       |
| 11.| Install compliant cycle storage spaces to meet the minimum levels set out in Tra 03 Alternative modes of transport: Criterion Table 37 on the facing page. |         |
| 5b| All (excluding sheltered housing, care homes and supported living facilities, student residents, key accommodation, transport hub and MOD residential and prison building types) | 1       |
| 12.| Provide at least two compliant facilities for the building users, (including pupils where appropriate to the building type) - see Definitions for the scope of each compliant facility:  
  a. Showers  
  b. Changing facilities  
  c. Lockers  
  d. Drying spaces. |         |
| 5c| Sheltered housing, case homes and supported living facilities and prison building types only | 1       |
Table 37 Cycle storage criteria for each building type

<table>
<thead>
<tr>
<th>Building Type</th>
<th>No. spaces per unit of measure</th>
<th>Unit of measure</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Commercial</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Offices, Industrial</td>
<td>1</td>
<td>10 staff</td>
<td>None</td>
</tr>
<tr>
<td><strong>Retail</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Large retail</td>
<td>1</td>
<td>10 staff</td>
<td>Use the maximum number of staff at any one time or shift. Provide staff spaces in addition to customer spaces. Separate spaces are encouraged but not essential as long as there is a minimum of 10 customer cycle spaces. Any retail development with at least 50 customer cycle storage spaces is compliant regardless of the number of parking spaces. The requirement for staff spaces would still need to be fully met.</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>20 public car parking spaces</td>
<td></td>
</tr>
<tr>
<td>Small retail</td>
<td>10</td>
<td>Total</td>
<td>Spaces are publicly accessible within proximity of a main building entrance. Compliant cyclists’ facilities are needed for staff only.</td>
</tr>
<tr>
<td><strong>Education</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Preschool or crèche</td>
<td>1</td>
<td>10 staff</td>
<td>None</td>
</tr>
<tr>
<td>Primary school</td>
<td>5</td>
<td>Per form or class in year group</td>
<td>For example: a primary school designed for three classes per year provides a total of 15 compliant cycle storage spaces for the whole school. If the number of forms or classes varies between year groups, base the calculation on the greatest number of classes or forms.</td>
</tr>
<tr>
<td>Secondary schools and sixth form, further and higher education (FE and HE)</td>
<td>1</td>
<td>10 staff &amp; pupils and students total</td>
<td>FE and HE student numbers account for both under- and post-graduates, as well as PhD students and post-doctorates. Use the sliding scale of compliance to determine the number of cycle spaces if there are more than 200 building users.</td>
</tr>
<tr>
<td><strong>Healthcare</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>All healthcare building types</td>
<td>1</td>
<td>10 staff</td>
<td>Use the largest unit of measure for the building type, e.g. use beds for a hospital, use consulting rooms for a GP surgery. A minimum of four compliant cycle storage spaces is required. Special healthcare building types, e.g. chemotherapy outpatient centre or maternity ward - For such building types, given the nature of the building function, the cycle storage spaces for ‘2 consulting rooms OR 10 beds’ (i.e. those intended for patients and visitors), might be excluded, as it is unlikely that patients and accompanying visitors would be cycling to and from the centre.</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>2 consulting rooms OR 10 beds</td>
<td></td>
</tr>
<tr>
<td><strong>Courts and Prisons</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Prison establishment located building</td>
<td>1</td>
<td>10 staff</td>
<td>Only one credit available with the provision of two cyclist facilities.</td>
</tr>
<tr>
<td>Building Type</td>
<td>Minimum Staff/Residents</td>
<td>Compliance Note</td>
<td></td>
</tr>
<tr>
<td>---------------</td>
<td>--------------------------</td>
<td>-----------------</td>
<td></td>
</tr>
<tr>
<td>Law court</td>
<td>10 building occupants (staff and visitors)</td>
<td>None</td>
<td></td>
</tr>
<tr>
<td><strong>Multi-residential</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Student residences, key worker accommodation</td>
<td>1</td>
<td>10 staff</td>
<td>A minimum of one compliant space is required.</td>
</tr>
<tr>
<td>Sheltered housing, care homes, supported living facility</td>
<td>1</td>
<td>10 staff</td>
<td></td>
</tr>
<tr>
<td><strong>Other buildings</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Type A (see Additional building type classifications)</td>
<td>Use office buildings criteria. The unit of measure for visitors or beds does not apply to hotels.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Type B (see Additional building type classifications)</td>
<td>1</td>
<td>10 staff</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>10 visitors or beds</td>
<td></td>
</tr>
<tr>
<td>Type C (see Additional building type classifications)</td>
<td>1</td>
<td>20 staff</td>
<td>A single credit can be awarded where spaces for staff only are provided as well as the appropriate compliant cyclists’ facilities. The compliance note allowing a reduction to the cyclist provision in rural locations has been accounted for in the unit of measure for this transport type. It should not therefore be applied again.</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>20 building visitors or beds</td>
<td></td>
</tr>
<tr>
<td>Transport hubs</td>
<td>1</td>
<td>10 public users</td>
<td>Apply the sliding scale (as per compliance note) to a maximum of 5000 daily public users. Public users refer to regular peak time users of the service who start or finish their public transport journey at the assessed building.</td>
</tr>
<tr>
<td>MOD non-residential</td>
<td>1</td>
<td>10 living-out personnel</td>
<td>These criteria apply to MOD buildings where the majority of personnel live off site.</td>
</tr>
<tr>
<td>MOD residential</td>
<td>1</td>
<td>2 residents</td>
<td>None</td>
</tr>
</tbody>
</table>

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.

**Compliance notes**

Compliance notes are located in Appendix G – Notes for compliance on page 18 for the consultation. These compliance notes will be available through the knowledge base when the scheme goes live.
Methodology

Number of building occupants unknown
If the number of building occupants commuting to the development cannot be confirmed, e.g. speculative developments, use the default occupancy rates given in the table in Tra 04 Maximum car parking capacity on page ccxli. Alternatively, the number of building occupants in an existing development of similar type and size can be used (the assessor must justify or validate the number used in their certification report).

Phased developments
New transport facilities provided at a later stage, as part of a large phased development, can be deemed to meet the requirements on condition that:

A commitment has been made within the General Contract Specification or in the form of a Section 106 Agreement, to provide transport facilities within the shortest of the following periods:

1. The transport facilities will be available for use by the time 25% of all phases have been completed and are ready for occupation. OR
2. The transport facilities will be available for use within 25% of the total build time for the phase in which the assessed building forms a part, measured from the completion date of that phase.

Where the transport facilities will not be available for use within a period of five years from occupation of the building, they cannot be considered for determining compliance with the BREEAM criteria.

Building locations with a high level of public transport accessibility
Sites where at least 50% of the available credits for BREEAM Issue Tra 01 Public transport accessibility have been awarded (rounded to the nearest whole credit) can reduce the number of compliant cycle spaces requirement by 50%. This reduction will also reduce the requirement for compliant shower or lockers by the same margin.

Building types where the number of required showers or lockers is not based on cycle storage provision can reduce the actual requirement for compliant showers or lockers by 50%.

This reduction cannot be combined with the sliding scale.

Rural locations
For sites in rural locations:

1. Where the distance to the nearest urban location is greater than 10 miles, the number of compliant cycle spaces can be reduced by 50%.
2. Where the distance to the nearest urban location is greater than 20 miles, the number of compliant cycle spaces can be reduced by 70%.
3. Where the distance to the nearest urban location is greater than 30 miles, the number of compliant cycle spaces can be reduced by 90%.

The reduction will also reduce the requirement for compliant shower and lockers by the same margin for most building types by default, since the calculation is based on the number of cycle storage spaces. Building types where the number of required showers or lockers is not based on cycle storage provision can reduce the actual requirement for compliant showers or lockers by 50%, 70% or 90% as appropriate.

This reduction cannot be applied in addition to the 50% reduction due to the building’s Public Transport Accessibility level (as described in Methodology).
Sliding scale of compliance

To recognise the increased confidence in availability that occurs where there is larger scale provision of facilities, it is acceptable to reduce the provision requirement for building users by increasing the standard unit of measure (defined in Table 37 on page ccooix) and potentially the provision of cyclists' facilities on a sliding scale as follows:

1. For buildings with more than 200 users but less than 300, the unit of measure can be increased by a ratio of 1.5.
2. For buildings with more than 300 users but less than 400, the unit of measure can be increased by a ratio of 2.
3. For buildings with more than 400 users, the unit of measure can be increased by a ratio of 2.5.

For example, an office building with 800 users would be required to provide the following number of cycle storage spaces:

- 1–200 users @ 1 space per 10 users = 20 spaces
- 201–300 users @ 1 space per 15 users (standard unit of measure x 1.5) = 7 spaces
- 301–400 users @ 1 space per 20 users (standard unit of measure x 2) = 5 spaces
- 401+ users @ 1 space per 25 users (standard unit of measure x 2.5) = 16 spaces

The sliding scale of compliance does not apply to the following building types: primary schools, multi-residential buildings and MOD residential buildings.

Minimum cycle storage provision

Where the calculated number of required cycle storage spaces is less than four, total provision should be based on the lower of the following:

1. A minimum of four compliant storage spaces must be provided OR
2. One space per user (staff and where appropriate other user groups).

 Provision of cycle storage and facilities on sites with multiple buildings

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 with this issue may be assessed based on the standalone building or on a site-wide basis. How this is determined depends on the configuration of the proposed cycle storage, cycle facilities and the interpretation and justification of the assessor.

Standalone approach

Cycle storage and associated facilities for the assessed building only:

Cyclists' storage:

- The number of cycle storage spaces is compliant based on the number of users in the assessed building. The sliding scale of compliance can be used (where applicable) when determining the number of storage spaces required.
- All storage spaces provided must be BREEAM compliant and these must be located within, or in close proximity to, the assessed building. Access arrangements, demarcation and positioning clearly associate the cycle storage provided with the assessed building only.

Cyclists' facilities:

- All new and existing facilities may be included provided they are BREEAM compliant.
- Facilities should be located within the assessed building, or in an accessible adjacent building for the sole use of the assessed building's users.
Site-wide approach
Cycle storage and associated facilities accessible to users of the entire site, or where there is a distinct group of local buildings within a site that would share facilities:

Cyclists' storage:
– The number of cycle storage spaces is compliant based on the number of users on site or within a group of local buildings. The sliding scale of compliance can be used (where applicable) when determining the number of storage spaces required.
– All new storage spaces must be BREEAM compliant. Existing storage spaces may also be counted, provided they allow bikes to be easily stored and accessed with the ability to be locked securely against a fixed structure.

Cyclists' facilities:
– The number of compliant cyclists' facilities is based on the number of users on site who would be able to use these facilities.
– Cyclists' facilities may be located anywhere on site. However, the total route that cyclists must take to access the nearest cycle storage, cyclists' facilities and building entrances must be no greater than 500m via a safe and convenient route. The distances should be measured from the first to the last point on the route. Where possible, different types of cyclist facilities should be grouped together in designated areas for ease of access and use.
– All new and existing facilities may be included provided they are BREEAM compliant and conform to the 500m requirement above.

Combination of the two approaches
A mixture of the two approaches can be applied where cycle storage is delivered as a site-wide approach and facilities are being met for the assessed building only. However, where the opposite is being proposed (i.e. storage spaces are provided only for the assessed building and facilities are provided on a site-wide basis); the number of compliant cyclists' facilities must be based on the number of users on site and the facilities must located in an accessible location in close proximity to the storage spaces.

Evidence

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Interim design stage</th>
<th>Final post-construction stage</th>
</tr>
</thead>
<tbody>
<tr>
<td>All</td>
<td>One or more of the appropriate evidence types listed in <em>The BREEAM evidential requirements on page 38</em> can be used to demonstrate compliance with these criteria.</td>
<td></td>
</tr>
</tbody>
</table>

Definitions

Additional building type classifications
Other Building transport type A: A building predominantly occupied by staff or employees with occasional business related visitors. This includes hotels.
Other Building transport type B: A building occupied by a number of core staff or employees with a larger number of consistently frequent visitors or users (either resident or non-resident). This includes secure accommodations.
Other Building transport type C: As type B, but building transport types specifically required to be located rurally as a result of their function, i.e. buildings which would never be located within an urban area, e.g. a National Park
visitor centre (see definition of rural and rural location sensitive buildings location).

**Compliant cycle storage spaces**

Compliant cycle storage spaces are defined as those that meet the following:

1. Cycles can be secured within spaces in racks with overhead covering. The cycle racks are set in or fixed to a permanent structure (building or hardstanding) or alternatively 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 the cycle racks and other obstructions, e.g. a wall, allows appropriate access to the cycle storage space for easy storage and access to bikes.
3. The storage facility or entrance to the facility is in a prominent site location that is visible to potential users from either an occupied building or a main access to a building.
4. The cycle storage facility has adequate lighting; demonstrated by meeting the lighting criteria in BREEAM issue Hea 01 Visual comfort on page 79. The lighting must be controlled to avoid out-of-hours use and operation during daylight hours, where there is sufficient daylight in or around the facility.

**Compliant changing facilities**

Compliant changing facilities are defined as those that meet the following:

1. Appropriately sized for the number of users. The assessor uses their judgment on whether the changing area is appropriately sized given the number of cycle storage spaces or showers provided.
2. Changing areas include adequate space and facilities to hang or store clothing and equipment while changing or showering, e.g. bench seat or hooks.
3. Toilet or shower cubicles cannot be counted as changing facilities.

**Compliant lockers**

Compliant lockers are defined as those that meet the following:

1. The number of lockers is at least equal to the number of cycle spaces required.
2. Lockers are in or adjacent to compliant changing rooms, where provided.
3. The lockers are sized appropriately for the storage of a cyclist’s equipment.

**Compliant drying spaces**

A compliant drying space is defined as a space that is specifically designed and designated with adequate heating and ventilation for the drying of wet clothes. A plant room, for example, is not a compliant drying space.

**Compliant showers**

Compliant showers are defined as those that meet the following:

1. Provision of one shower for every 10 cycle storage spaces, subject to a minimum provision of one shower.
2. Any building providing eight showers or more complies regardless of the number of cycle storage spaces provided.
3. Both male and female users must be catered for either separate showers within shared gender-specific facilities (required provision split 50-50) or single shower cubicles and changing space for mixed use.
4. The showers do not need to be dedicated to cyclists and can be those shared with other users or uses.

**Small retail type**

Includes 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’ facilities.

**Large retail type**

Includes 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 cyclist facilities.
Rural location

A rural location is defined in this context as a site clearly not within or on the boundary of a small, medium or large urban cover. An urban cover will have a population of 3000 people or more, located within a tract of continuously built-up urban land extending 20 hectares or more. Therefore, the definition of rural includes village locations, green field sites or small urban centres with a population of less 3000 people within a tract of land no greater than 20 hectares. Such locations will most likely be on a local bus route to larger urban areas or other local towns and may have local shops and other facilities. This classification is based on the Department of Transport National Travel Survey definition, which specifies urban areas based on the extent of urban development indicated on Ordnance Survey maps.

Rural location sensitive buildings

This definition includes any of the building types (listed below) where there is a demonstrable social or economic need from a rural population for the service and demand, which the new building is intended to meet; and therefore locating the building at an alternative site which could have higher public transport accessibility levels, i.e. within an urbanised area, is unfeasible. The following building types are examples of those that may fall into this category.

1. Offices where providing services to the local community
2. Industrial where providing services to the local community
3. Retail where providing services to the local community
4. Preschool, primary and secondary school
5. GP surgery

Additional information

None.
Tra 04 Maximum car parking capacity

Aim

To avoid excessive use of private cars by limiting car parking provision, thereby helping to reduce transport-related emissions and traffic congestion associated with the building’s operation.

Value

- Reduced land requirements and associated costs
- Improved safety and security around the building or site
- Discourages reliance on the private car for commuters by restricting the number of car parking spaces provided
- Encourages the use of public transport for sites located in the proximity of transport links
- Reduces transport-related energy use, congestion, noise pollution, carbon emissions and traffic-related issues
- Encourages active travel, improving people’s health

Context

Cities around the world are actively looking at ways of improving quality of life, air quality, congestion, etc. The use of private cars is a key area that is being looked at. This is resulting in the consideration of increasingly stringent policies relating to controls over private car use and the dependency on them. Future asset value is likely to be impacted by the availability of alternative means of transport and their viability is dependent on the ease of private car use. Reducing car parking provision is a key area being considered.
While limiting car park provision for a development benefits building users’ health, on a larger scale it frees up space for public space improvements and on-site amenity space with consequent benefits to occupant health, wellbeing and satisfaction. It also challenges the perception that there is never enough parking, when the reality is different.

Assessment scope

<table>
<thead>
<tr>
<th></th>
<th>Fully fitted</th>
<th>Simple building</th>
<th>Shell and core</th>
<th>Shell only</th>
</tr>
</thead>
<tbody>
<tr>
<td>Applicable Assessment criteria</td>
<td>All</td>
<td>Not applicable</td>
<td>All</td>
<td>All</td>
</tr>
<tr>
<td>Assessment type specific notes</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>None</td>
</tr>
</tbody>
</table>

None

Building type specific
None
Tra 04 Maximum car parking capacity

Assessment criteria

Up to two credits - Car parking capacity

1. Determine the Accessibility Index (AI) in accordance with BREEAM issue Tra01 Public transport accessibility on page ccxxiii, so that the building’s car parking capacity relates to the development’s accessibility to the public transport network.
2. Compare the building’s car parking capacity to the maximum car parking capacity benchmarks in Table 38 and award the relevant number of BREEAM credits.

<table>
<thead>
<tr>
<th>Building Type</th>
<th>Criteria</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Max. parking capacity</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 space per x building users, where x is:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Office, industrial, student residences and key</td>
<td>&lt;4</td>
<td>1</td>
</tr>
<tr>
<td>worker accommodation</td>
<td>≥4 &lt; 8</td>
<td></td>
</tr>
<tr>
<td>Sheltered housing, care homes and supported living</td>
<td>≥ 8</td>
<td></td>
</tr>
<tr>
<td>facility</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Further and higher education</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other Building – Transport type 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other Building – MOD (where building users</td>
<td></td>
<td></td>
</tr>
<tr>
<td>are ‘living-out personnel’)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Healthcare - Hospitals (Acute, Specialist,</td>
<td></td>
<td></td>
</tr>
<tr>
<td>teaching, mental health)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Healthcare - GP surgery, health centre,</td>
<td></td>
<td></td>
</tr>
<tr>
<td>community hospital</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Preschool, schools, sixth form, Retail, Prison,</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Court, Other Building – Transport type 2,</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other Building – Transport type 3, Other</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Building – Transport hubs</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

For the building types listed below, the maximum number of parking spaces provided must not be greater than the total of the following:

<table>
<thead>
<tr>
<th>Building Type</th>
<th>Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>Healthcare - Hospitals (Acute, Specialist, teaching, mental health)</td>
<td>One parking space for every four staff, plus; One parking space for every four beds, plus Two parking spaces for each consulting, examination, treatment, therapy room and A&amp;E cubicle.</td>
</tr>
<tr>
<td>Healthcare - GP surgery, health centre, community hospital</td>
<td>One parking space for every two medical staff, plus; One parking space for every three non-medical staff, plus; Two parking spaces for each consulting, examination, treatment, therapy room and A&amp;E cubicle.</td>
</tr>
<tr>
<td>Preschool, schools, sixth form, Retail, Prison, Court, Other Building – Transport type 2, Other Building – Transport type 3, Other Building – Transport hubs</td>
<td>Issue not assessed for these building types</td>
</tr>
</tbody>
</table>
Compliance notes

Compliance notes are located in Appendix G – Notes for compliance on page 18 for the consultation. These compliance notes will be available through the knowledge base when the scheme goes live.

Methodology

Exclusions

Parking spaces set aside for the following building users can be excluded provided these spaces are dedicated for that use, i.e. sized accordingly with the appropriate signage or markings:

1. Disabled
2. Parent and baby
3. Motorbike
4. Car share
5. Operational

In the case of excluding car share spaces, the future building occupier will need to confirm they have an enforceable car share policy.

Parking shared with other buildings

Where the assessed building forms part of a wider site, e.g. campus, business park, hospital, and parking is not designated to individual buildings, then the assessor has two options:

1. Assess compliance on the basis of parking capacity for the whole development, accounting for all existing and new users and parking spaces.
2. Assess compliance using a pro-rata of parking capacity to building users, e.g. if the assessed building is occupied by 20% of the development’s total occupants, then attribute 20% of the total parking spaces to the assessed building for the purpose of the assessment.

Evidence

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Interim design stage</th>
<th>Final post-construction stage</th>
</tr>
</thead>
<tbody>
<tr>
<td>All</td>
<td>One or more of the appropriate evidence types listed in The BREEAM evidential requirements on page 38 can be used to demonstrate compliance with these criteria.</td>
<td>As per interim design stage.</td>
</tr>
<tr>
<td>All</td>
<td>Where relevant, a completed copy of Tra 01 calculator confirming the building’s Accessibility Index.</td>
<td>As per interim design stage.</td>
</tr>
</tbody>
</table>
Definitions

Additional building type classifications
High Education transport type 1: H.E. buildings located on a campus where less than 25% of students are resident on the campus or within 1 km radius from the campus’ main entrance.
High Education transport type 2: H.E. buildings located on a campus where 25% or more of the students are resident on the campus or within 1 km radius from the campus’ main entrance.
Other Building transport type 1: A building predominantly occupied by staff or employees with occasional business related visitors.
Other Building transport type 2: A building occupied by a number of core staff or employees with a larger number of consistently frequent visitors or users (either resident or non-resident).
Other Building transport type 3: As type 2, but building types specifically required to be located rurally as a result of its function, i.e. a building which would never be located within an urban area, e.g. a National Park visitor centre (see definition of rural and rural location sensitive buildings location).

Accessibility index (AI)
An indicator of the accessibility and density of the public transport network at a point of interest (in the case of BREEAM, a building). The index is influenced by the proximity and diversity of the public transport network and the level or frequency of service at the accessible node. For example, a building that has a single public transport node 500m from its main building entrance with one service stopping every 15 minutes, i.e. four services per hour on average, will score an AI of approximately 1.90. Alternatively, the same node with one service every 15 minutes, but 300m from the building entrance will achieve an AI of 2.26. The same node with two services stopping every 15 minutes will score an AI of 2.85. The greater the number of compliant nodes, services and their proximity to the building, the higher the AI.

Building users
Where the term building users is referenced in this BREEAM issue it refers to the following, where relevant to the building type:

1. Staff (who will work within the building).
2. Students (who will access the building for work or study during a typical academic term time or semester day).
3. Residents (who will reside permanently or for a short period of time in the building).
If known, or can be reasonably estimated, project specific occupancy figures should be used. If this is not possible, for example where the building is a speculative project, use the default occupancy rates given in Table 39 to determine the number of users. Where the number of building users is variable, provision of parking spaces should be based on the maximum number of building users likely to be using the building at any time during a typical day.

Care homes
For the purpose of BREEAM, care homes are defined as those buildings which are legally required to register with the Commission for Social Care Inspection by the Care Standards Act, 2000.
MOD Living-out personnel
This refers to staff that work in the assessed building and are not residents on the MOD site where the assessed building is located.

Operational parking spaces
Parking spaces dedicated to vehicles which are used as part of the building’s operation. For example, delivery vehicles or maintenance vehicles, which are required to travel off site, in connection with the building’s operations.

Rural location
A rural location is defined in this context as a site clearly not within or on the boundary of a small, medium or large urban cover. An urban cover will have a population of 3000 people or more, located within a tract of continuously built-up urban land extending 20 hectares or more. Therefore, the definition of rural includes village locations, green field sites or small urban centres with a population of less 3000 people within a tract of land no greater than 20 hectares. Such locations will most likely be on a local bus route to larger urban areas or other local towns and may have local shops and other facilities. This classification is based on the Department of Transport National Travel Survey definition, which specifies urban areas based on the extent of urban development indicated on Ordnance Survey maps.

Rural location sensitive buildings
This definition includes any of the building types (listed below) where there is a demonstrable social or economic need from a rural population for the service and demand, which the new building is intended to meet; and therefore locating the building at an alternative site which could have higher public transport accessibility levels, i.e. within an urbanised area, is unfeasible. The following building types are examples of those that may fall into this category.

1. Offices where providing services to the local community
2. Industrial where providing services to the local community
3. Retail where providing services to the local community
4. Preschool, primary and secondary school
5. GP surgery

Sheltered housing
Sheltered housing falls within Class C3 of the Town and Country Planning (Use Classes) Order 1987, and can be defined as self-contained accommodation, usually with an emergency alarm system, communal facilities and a resident warden. This includes all sheltered housing defined as ‘Category 1, 2, 2.5 and 3’ in accordance with the 1969 Ministry of Housing and Local Government Circular 82/69 and Local Authority Guidelines.

Additional information

<table>
<thead>
<tr>
<th>Building type and function area</th>
<th>Occupant density</th>
<th>Building type and function area</th>
<th>Occupant density</th>
</tr>
</thead>
<tbody>
<tr>
<td>Business</td>
<td></td>
<td>Secure residential institution</td>
<td></td>
</tr>
<tr>
<td>Office area (including reception areas)</td>
<td>0.111</td>
<td>Cell</td>
<td>0.190</td>
</tr>
<tr>
<td>Food preparation area</td>
<td>0.108</td>
<td>Reception</td>
<td>0.121</td>
</tr>
<tr>
<td>Building type and function area</td>
<td>Occupant density</td>
<td>Building type and function area</td>
<td>Occupant density</td>
</tr>
<tr>
<td>--------------------------------</td>
<td>-----------------</td>
<td>--------------------------------</td>
<td>-----------------</td>
</tr>
<tr>
<td>(staffed)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Small workshop or category lab</td>
<td>0.068</td>
<td>Hall, lecture theatre or</td>
<td>0.183</td>
</tr>
<tr>
<td>space</td>
<td></td>
<td>assembly area</td>
<td></td>
</tr>
<tr>
<td><strong>Industrial</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Food preparation area</td>
<td>0.213</td>
<td>Workshop - small-scale</td>
<td>0.048</td>
</tr>
<tr>
<td>Industrial process area</td>
<td>0.022</td>
<td>Laundry</td>
<td>0.086</td>
</tr>
<tr>
<td>Laboratory</td>
<td>0.107</td>
<td>Classroom</td>
<td>0.183</td>
</tr>
<tr>
<td>Reception</td>
<td>0.110</td>
<td>Office and consulting areas</td>
<td>0.093</td>
</tr>
<tr>
<td>Warehouse storage</td>
<td>0.009</td>
<td>Food preparation area</td>
<td>0.111</td>
</tr>
<tr>
<td>Generic office area</td>
<td>0.108</td>
<td>Libraries, museums, galleries</td>
<td></td>
</tr>
<tr>
<td><strong>Hospitals, care homes</strong></td>
<td></td>
<td>Reception</td>
<td>0.095</td>
</tr>
<tr>
<td>Reception</td>
<td>0.152</td>
<td>Food preparation area</td>
<td>0.176</td>
</tr>
<tr>
<td>Post mortem facility</td>
<td>0.050</td>
<td>Hall, lecture theatre or</td>
<td>0.150</td>
</tr>
<tr>
<td>assembly area</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Food preparation area</td>
<td>0.161</td>
<td>Laboratory</td>
<td>0.098</td>
</tr>
<tr>
<td>Physiotherapy studio</td>
<td>0.200</td>
<td>Workshop - small-scale</td>
<td>0.062</td>
</tr>
<tr>
<td>Bedroom unit</td>
<td>0.105</td>
<td>Display and public areas</td>
<td>0.150</td>
</tr>
<tr>
<td>Laundry</td>
<td>0.117</td>
<td>Generic office area</td>
<td>0.099</td>
</tr>
<tr>
<td>24-hours consulting or</td>
<td>0.000</td>
<td>General assembly and leisure,</td>
<td></td>
</tr>
<tr>
<td>treatment areas</td>
<td></td>
<td>clubs, theatres</td>
<td></td>
</tr>
<tr>
<td>Assembly areas or halls</td>
<td>1.000</td>
<td>Dry sports hall</td>
<td>0.047</td>
</tr>
<tr>
<td>Hydrotherapy pool hall</td>
<td>0.100</td>
<td>Fitness studio</td>
<td>0.132</td>
</tr>
<tr>
<td>Industrial process area</td>
<td>0.124</td>
<td>Fitness suite or gym</td>
<td>0.170</td>
</tr>
<tr>
<td>Laboratory</td>
<td>0.080</td>
<td>Food preparation area</td>
<td>0.131</td>
</tr>
<tr>
<td>Operating theatre</td>
<td>0.125</td>
<td>Hall, lecture theatre or</td>
<td>0.175</td>
</tr>
<tr>
<td></td>
<td></td>
<td>assembly area</td>
<td></td>
</tr>
<tr>
<td>Classroom</td>
<td>1.000</td>
<td>Auditoria</td>
<td>0.341</td>
</tr>
<tr>
<td>Diagnostic imaging</td>
<td>0.100</td>
<td>Ice rink</td>
<td>0.225</td>
</tr>
<tr>
<td>Generic ward</td>
<td>0.175</td>
<td>Performance area (stage)</td>
<td>0.049</td>
</tr>
<tr>
<td>Office and consulting areas</td>
<td>0.195</td>
<td>Public circulation areas</td>
<td>0.241</td>
</tr>
<tr>
<td><strong>Primary healthcare</strong></td>
<td></td>
<td>Reception</td>
<td>0.126</td>
</tr>
<tr>
<td>Reception</td>
<td>0.11</td>
<td>Sales area - general</td>
<td>0.102</td>
</tr>
<tr>
<td>Office and consulting areas</td>
<td>0.082</td>
<td>Swimming pool</td>
<td>0.163</td>
</tr>
<tr>
<td><strong>Further and higher education</strong></td>
<td></td>
<td>Workshop - small-scale</td>
<td>0.067</td>
</tr>
<tr>
<td>Residents bedroom</td>
<td>0.120</td>
<td>Generic office area</td>
<td>0.116</td>
</tr>
<tr>
<td>Classroom</td>
<td>0.203</td>
<td>Display area</td>
<td>0.001</td>
</tr>
<tr>
<td>Food preparation area</td>
<td>0.096</td>
<td><strong>Community or day centres</strong></td>
<td></td>
</tr>
<tr>
<td>Hall, lecture theatre or</td>
<td>0.202</td>
<td>Reception</td>
<td>0.108</td>
</tr>
<tr>
<td>assembly area</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Computer laboratory</td>
<td>0.231</td>
<td>Dry sports hall</td>
<td>0.047</td>
</tr>
<tr>
<td>Laboratory</td>
<td>0.106</td>
<td>Food preparation area</td>
<td>0.143</td>
</tr>
<tr>
<td>Laundry</td>
<td>0.105</td>
<td>Workshop - small-scale</td>
<td>0.064</td>
</tr>
<tr>
<td>Reception</td>
<td>0.112</td>
<td>Hall, lecture theatre or</td>
<td>0.169</td>
</tr>
<tr>
<td></td>
<td></td>
<td>assembly area</td>
<td></td>
</tr>
<tr>
<td>Workshop - small scale</td>
<td>0.068</td>
<td>Office and consulting areas</td>
<td>0.106</td>
</tr>
<tr>
<td>Office and consulting areas</td>
<td>0.098</td>
<td><strong>Other spaces and buildings</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Hotels</strong></td>
<td></td>
<td>Data centre</td>
<td>0.096</td>
</tr>
<tr>
<td>Bedroom</td>
<td>0.094</td>
<td>Server room</td>
<td>0.096</td>
</tr>
<tr>
<td>Food preparation area</td>
<td>0.108</td>
<td>Heavy plant room</td>
<td>0.096</td>
</tr>
<tr>
<td>Building type and function area</td>
<td>Occupant density</td>
<td>Building type and function area</td>
<td>Occupant density</td>
</tr>
<tr>
<td>---------------------------------</td>
<td>------------------</td>
<td>---------------------------------</td>
<td>------------------</td>
</tr>
<tr>
<td>Reception</td>
<td>0.105</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Generic office area</td>
<td>0.106</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Default occupancy rates**

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 uses 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.
**Tra 05 Travel plan**

<table>
<thead>
<tr>
<th>Fully fitted</th>
<th>Simple building</th>
<th>Shell &amp; core</th>
<th>Shell only</th>
<th>No Minimum standards</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Aim**

To minimise the environmental, economic and social impacts of transport use in operation through careful design and the preparation of information to aid the ongoing management of the building and its occupants.

**Value**

- Promotes the implementation of travel solutions that are relevant to the challenges and opportunities of a specific site
- Raise awareness, understanding and accessibility of travel options, allowing for affordable access to services
- Encourages more sustainable modes of transport and movement of people and goods to and around the site
- Allows designers to take account of the travel needs of future occupants, thus allowing for better management in operation
- Reduced congestion and improved safety of the site and local roads
- Increased attractiveness of the site to potential users

**Context**

The National Planning Practice Guidance indicates that travel plans should be considered in parallel to development proposals and that they should be integrated into the design of a new site.
Based on evidence of the anticipated transport impacts of new developments, Travel Plans are a long-term management strategy for implementing the mitigating measures addressed by the Transport Assessments or Statements.

While they are not meant to unrealistically penalise drivers and impact negatively on the local street network, they intend to promote sustainable and active travel. Their purpose is to deliver transport and transport-related benefits to the development itself but also to the wider community. As they include a package of actions designed to address the needs of the users in that local area, effective but unpopular solutions, such as parking restrictions, can be combined with popular but expensive solutions, such as bus subsidies, to ensure that the negative impacts are neutralised by the benefits.

The transport tools proposed by the Travel Plan are user-focused and ensure the increase and improvement of travel choices to the users, cost savings and improved company image and staff health and wellbeing.

### Assessment scope

<table>
<thead>
<tr>
<th>Applicable Assessment criteria</th>
<th>Fully fitted</th>
<th>Simple building</th>
<th>Shell and core</th>
<th>Shell only</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assessment type specific notes</td>
<td>None</td>
<td>None</td>
<td>See ref. 1.0</td>
<td>None</td>
</tr>
</tbody>
</table>

**1.0 End occupier is not known**

A travel plan is still required even if the end user or occupier is not known, albeit that it may only be an interim travel plan or one that broadly addresses all the issues covered in the assessment criteria. The developer must confirm that they will hand over a copy of the travel plan to the building’s future tenants or owner-occupier, so that it may inform their own travel plan or strategy.

### Building type specific

None
Tra 05 Travel plan

Assessment criteria

One credit
1. Develop a travel plan during the feasibility and design stages.
2. Produce a site-specific travel assessment or statement for the particular site covering, as a minimum:
   2.a. Existing travel patterns and opinions of existing building or site users towards cycling and walking, identifying constraints and opportunities, if relevant.
   2.b. Travel patterns and transport impact of future building users
   2.c. Current local environment for walkers and cyclists (accounting for visitors who may be accompanied by young children).
   2.d. Disabled access (accounting for varying levels of disability and visual impairment).
   2.e. Public transport links serving the site.
3. Includes a package of measures in the travel plan to encourage the use of sustainable modes of transport and movement of people and goods during the building’s operation and use.
4. Involve the occupier, if known, in the development of the travel plan and confirm they will implement it post-construction with in-use operational support from the building’s management.

Compliance notes
Compliance notes are located in Appendix G – Notes for compliance on page 18 for the consultation. These compliance notes will be available through the knowledge base when the scheme goes live.

Methodology

Travel assessment or statement
A travel assessment (also referred to as transport assessment) will be required where a proposed development is likely to have significant transport and related environmental impacts. The study area for a transport assessment related to a proposed development should be determined in discussions between the developer and appropriate authorities. A transport statement is required where the proposed development is not likely to have a significant transport impact. A transport statement is suitable to demonstrate compliance with BREEAM when the proposed development is expected to generate relatively low numbers of trips or traffic flows, with minor transport impacts. For further guidance refer to: Transport evidence bases in plan making and decision taking.
Travel plan measures

The following measures could be considered as part of the travel plan for development:

- Providing parking priority spaces for car sharers
- Providing dedicated and convenient cycle storage and changing facilities
- Lighting, landscaping and shelter to make pedestrian and public transport waiting areas pleasant
- Negotiating improved bus services, i.e. altering bus routes or offering discounts
- Restricting or charging for car parking
- Criteria for lobby areas where information about public transport or car sharing can be made available.
- Pedestrian and cycle friendly (for all types of user regardless of the level of mobility or visual impairment) via the provision of cycle lanes, safe crossing points, direct routes, appropriate tactile surfaces, well-lit and signposted to other amenities, public transport nodes and adjoining off-site pedestrian and cycle routes
- Providing suitable taxi drop-off or waiting areas
- Ensuring that rural buildings are located with appropriate transport access to ensure that they adequately serve the local community (where procured to do so, e.g. community centre).

Evidence

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Interim design stage</th>
<th>Final post-construction stage</th>
</tr>
</thead>
<tbody>
<tr>
<td>All</td>
<td>One or more of the appropriate evidence types listed in The BREEAM evidential requirements on page 38 can be used to demonstrate compliance with these criteria.</td>
<td></td>
</tr>
</tbody>
</table>

Definitions

Travel plan

A travel plan is a strategy for managing all travel and transport within an organisation, principally to increase choice and reduce reliance on the car by seeking to improve access to a site or development by sustainable modes of transport. A travel plan contains both physical and behavioural measures to increase travel choices and reduce reliance on single occupancy car travel.

Building users

Where the term 'building users' is used, this refers to the following, as appropriate to building type:

1. Staff (commuter journeys and business travel)
2. Pupils and students
3. Visitors
4. Patients
5. Customers
6. Community users
7. Personnel who make deliveries and collections to and from the development
8. Contractors or service providers, who regularly work at and access the building or development
Additional information

None.
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.

Wat 01 Water consumption min standards 5 credits
- Reducing the demand for potable water through the provision of efficient sanitary fittings, rainwater collection and water recycling systems.

Wat 02 Water monitoring min standards 1 credit
- Specification of water meters to allow for management and monitoring of water use in the building. This encourages reductions in water use by identifying areas of high usage and investigating potential causes.

Wat 03 Water leak detection 2 credits
- Reducing the unintended water consumption due to leaks by installing leak detection systems and flow control devices.

Wat 04 Water efficient equipment 1 credit
- Reducing water consumption for non-domestic scale, non-sanitary water uses by specifying efficient systems and improving the design efficiency of any water-using processes.
Wat 01 Water consumption

Aim

To reduce the consumption of potable water for sanitary use in new buildings through the use of water efficient components and water recycling systems.

Value

- Improving water efficiency and reducing cost related to water consumption in use.
- Reducing potable water use so helping to conserve stretched water reserves at times of shortage.
- Reducing water industry greenhouse gas emissions, pollution impacts and associated costs on a national level.

Context

In England the average person uses about 150 litres of water a day for a range of uses including sanitation, where significant savings are possible. Given that climate projections forecast half as much rainfall in summer in the South East of England by 2080, it is important to build water efficiency into our building stock and minimise the need for major infrastructure enhancements to meet these pressures as well as growing demands. Under these scenarios and with the expected high population growth, unless adaptation interventions are made, deficits are
expected to be already widespread by the 2050s. The UK is expected to be in deficit by up to 16% of the total water demand in the 2050s and of up to 29% in the 2080s leading to major impacts on cost and resource levels (166).

**Assessment scope**

<table>
<thead>
<tr>
<th>Applicable Assessment criteria</th>
<th>Fully fitted</th>
<th>Simple building</th>
<th>Shell and core</th>
<th>Shell only</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assessment type specific notes</td>
<td>None</td>
<td>None</td>
<td>see ref 1.0 and 1.1</td>
<td>see ref 1.2</td>
</tr>
</tbody>
</table>

**Assessment type specific**

1.0 Components to be included as a minimum:
   - WCs
   - wash-hand basin taps
   - showers
   - urinals
   - kitchen taps: kitchenette

If the developer is not installing some of these, use the baseline values for any unknown components.

All water-consuming components and greywater or rainwater systems specified and installed by the developer are assessed.

Components not listed above and located within tenant areas that are not specified by the developer, but will be specified by the tenant, do not need to be assessed.

In cases where the end client is known and they make a commitment to specify and install specific water-consuming components, assess the issue based on the relevant information.

1.1 Where components are not specified and installed by the developer but by the tenant, the minimum standard will not prevent the assessment from achieving a BREEAM rating.

1.2 Minimum standard is not applicable.

**Building type specific**

2.0 **Healthcare** Components in clinical areas may be omitted. Clinical areas refer to all areas with a scrub-up trough, clinical sink or clinical basin. This is not an exhaustive list and guidance should always be sought from the appropriate professional, to ascertain areas of exemption specific to infection control and other considerations. Appropriate professionals could include a health authorities infection control officer or a client infection control representative or equivalent.

Although exempt, HTM 07-04(167) contains guidance on water savings from medical-related activities. Furthermore, in some cases, the use of water efficient fittings and appliances may not be appropriate to the needs of the patient, and inappropriate specification may adversely affect the incidence and propagation of infections. In such instances, the assessor will need to confirm with BRE Global whether components from the relevant building areas are exempt. The design team should also consult NHS guidelines concerning appropriate selection of sanitary fittings and fixtures and the control of Legionella.
**Wat 01 Waterconsumption**

**Assessment criteria**

**Up to five credits**

1. Use the BREEAM Wat 01 calculator to assess the efficiency of the domestic water-consuming components.

2. Use the standard Wat 01 method (see Methodology on the facing page) to compare the water consumption (L/person/day) for the assessed building against a baseline performance. Award BREEAM credits based upon Table 40 below. Where it is not possible to use the standard method, complete the assessment using the alternative Wat 01 method (see Methodology on the facing page).

<table>
<thead>
<tr>
<th>No. of BREEAM credits</th>
<th>% improvement</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>12.5%</td>
</tr>
<tr>
<td>2</td>
<td>25%</td>
</tr>
<tr>
<td>3</td>
<td>40%</td>
</tr>
<tr>
<td>4</td>
<td>50%</td>
</tr>
<tr>
<td>5</td>
<td>55%</td>
</tr>
<tr>
<td>1 Exemplary performance credit</td>
<td>65%</td>
</tr>
</tbody>
</table>

For some building types an alternative approach to compliance must be used to award credits (for further information please refer to Methodology on the facing page and the BREEAM Wat 01 calculator).

3. If a greywater or rainwater system (see Definitions on page cclxix) is specified, use its yield in L/person/day to offset potable water demand from components.

4. If a greywater or rainwater system is specified, specify and install:

   4.a. Greywater systems in compliance with BS 8525-1:2010 Greywater Systems - Part 1 Code of Practice\(^{(168)}\).


**Additionally for Healthcare building types only:**

5. The flushing control for each WC or urinal must be suitable for operation by patients with frail or infirm hands or activated by electronic sensors (see).

**Additionally for Prison building types only:**

6. Sanitary components specified within a prison cell have a volume controller specified on the individual fittings or water supply to each cell (see Definitions on page cclxix).

**Exemplary level criteria**

To achieve an exemplary performance credit:

7. Achieve criteria 1 to 4 above (and if applicable 5 or 6 above).

8. The water consumption (L/person/day) for the assessed building achieves the 65% improvement described as exemplary performance in Table 40 above.
Compliance notes

Compliance notes are located in Appendix G – Notes for compliance on page 18 for the consultation. These compliance notes will be available through the knowledge base when the scheme goes live.

Methodology

Calculation of water efficiency performance

A non-domestic building’s water efficient performance is determined using the BREEAM Wat 01 calculator.

Include the efficiency of the following domestic scale water-consuming components (where specified):

- WCs
- Urinals
- Taps (wash-hand basins and, where specified, kitchen taps and waste disposal unit)
- Showers
- Baths
- Dishwashers (domestic and commercial-sized)
- Washing machines (domestic and commercial or industrial sized).

The BREEAM Wat 01 calculator defines the building types and activity areas for which the above components must be assessed.

Use one of the following methods to determine the building’s water efficient performance:

- Standard approach for common building types
- Alternative method for other building types

Each method is summarised below.

Standard Wat 01 method

This method uses the building’s actual component specification and default usage patterns for the building type and its activity areas to determine water efficiency (measured in L/person/day and m³/person/yr) for a building. The modelled output is compared with the output for a baseline component specification and the water demand saving determined as a percentage improvement. The percentage improvement determines the number of BREEAM credits achieved, see Table 40 on the previous page.

The baseline component specification is equivalent to the water efficiency of industry standard components (see Table 42 on page cdxv), steered by the minimum levels required by the Water Supply (Water Fittings) Regulations (170) and Part G of the Building Regulations (171). The BREEAM percentage improvement benchmarks are based on progressively more efficient standards and product market availability for water-consuming components. For the higher levels of performance, the specification of greywater and rainwater systems is required.

The standard approach is the default method for calculating the water efficiency of the assessed building. It is used for most of the common building types, where usage data are available. For building types where usage data are not available, the standard approach cannot be used, an alternative approach to compliance must be used (described below). Refer to the BREEAM Wat 01 calculator for the building types which can currently be assessed using the standard approach.

Alternative Wat 01 method

Where the standard approach cannot be used to determine the building’s water consumption (L/person/day) the
assessment is completed on an elemental basis, as follows:

1. Use the list of applicable domestic scale water-consuming components and determine those that are specified or present in the assessed building.

2. Use the actual specification for each component type to complete the 'Other building type calculator' worksheet of the BREEAM Wat 01 calculator. Table 42 on the facing page defines the levels of performance for each component type. The volumes quoted are maximum values for each level but the greywater or rainwater system % is a minimum for the % of WC or urinal flushing demand met using recycled non-potable water.

3. Weightings applied in the calculator are:
   a. Building type specific weightings to each component level to reflect its 'in-use' consumption relative to the other components present. A component with high 'in-use' water consumption has a higher weighting than one with lower 'in-use' consumption and therefore makes a relatively larger contribution to the building’s overall level of performance.
   b. Derived from data on actual water consumption per day from non-domestic buildings, sourced from BBNWAT22(172). These are in the BREEAM Wat 01 calculator.

4. Based upon the performance level of each component type and the component weighting, the calculator determines an overall level of performance and awards the relevant number of BREEAM credits, see Table 41 below.

Table 41: BREEAM credits based on overall performance level

<table>
<thead>
<tr>
<th>Overall component level</th>
<th>Greywater and rainwater level achieved</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Baseline</td>
<td>0 credits</td>
</tr>
<tr>
<td>Level 1</td>
<td>1 credit</td>
</tr>
<tr>
<td>Level 2</td>
<td>2 credits</td>
</tr>
<tr>
<td>Level 3 or 4</td>
<td>3 credits</td>
</tr>
<tr>
<td>Level 5</td>
<td>4 credits</td>
</tr>
</tbody>
</table>

1. An exemplary performance credit is awarded where the component specification achieves level 5 and > 95% of WC or urinal flushing demand is met using recycled non-potable water.

2. Achieving a specific overall component level does not necessarily mean that an equivalent number of credits is awarded. The levels are not directly linked to the improvement percentages and the greywater and rainwater levels achieved also have an influence.

3. Due to the use of the weightings, the overall component level achieved is not necessarily a whole number. Where this is the case the methodology always rounds down to the nearest component level and therefore BREEAM credits level, e.g. if the component specification achieved is 3.6 credits, the actual number of credits awarded is 3 credits (the methodology does not round up to 4 credits because the performance specification for 4 credits has not been achieved).

4. Where the assessed building development has multiple specifications for the same water-consuming component type, the number of fittings and component level achieved for each specification is entered in the 'Other building type calculator'. Using this information, the calculator determines the building’s aggregated performance level for that component type.

While attempts have been made to align the benchmarking of both the standard and alternative methodologies, performance is determined in different ways. The number of BREEAM credits awarded by each method could differ for the same water component specification. This could lead to variation in the credits achieved when applying BREEAM New Construction to a number of different building types that form a part of the same overall development.

Component type

Table 42 outlines the consumption performance levels, by component type, used in BREEAM. These levels of efficiency have been steered by a range of published sources of information(173) and reflect robust levels of typical, good, best and exemplary practice.
Table 42 Water efficient consumption levels by component type

<table>
<thead>
<tr>
<th>Component</th>
<th>Performance levels (quoted numbers are minimum performance required to achieve the level)</th>
<th>Unit</th>
<th>Base</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>WC</td>
<td>Effective flush volume (litres) (see Definitions on page cclxix)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wash-hand basin taps</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Showers</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Baths</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Urinal (2 or more urinals)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Urinal (1 urinal only)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Greywater and rainwater system</td>
<td>% of WC or urinal flushing demand met using recycled non-potable water</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kitchen tap: kitchenette</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kitchen taps: restaurant (pre-rinse nozzles only)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Domestic sized dishwashers</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Domestic sized washing machines</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Waste disposal unit</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Commercial sized dishwashers</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Commercial or industrial sized washing machines</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Specifying components for a building in accordance with the above levels might result in the corresponding number of BREEAM credits being achieved. However, the component specifications above are akin to thresholds between each level. Therefore caution should be exercised when defining a component specification for a BREEAM-assessed building using exactly the same levels as the threshold levels. It is recommended that, where Wat 01 credits are targeted, the performance of a particular building’s component specification is verified using the BREEAM Wat 01 calculator before committing to a particular specification and ordering or installing components. This will provide greater assurance that the component specification achieves the targeted number of BREEAM credits.

Water-consuming components - data requirements

For each component type, the appropriate data will need to be collected from manufacturers’ product information to complete the assessment.

Table 43 Data requirements for each domestic component type

<table>
<thead>
<tr>
<th>Domestic component</th>
<th>Data requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>WC</td>
<td>Actual maximum or, where dual flush, effective flush volume in litres/use.</td>
</tr>
<tr>
<td>Urinals</td>
<td>Flush volume in litres/use for single use flush urinals. For cistern fed systems, the flushing frequency/hour and cistern capacity in litres.</td>
</tr>
</tbody>
</table>
| Taps          | Flow rate of each tap, at full flow rate in litres per minute measured at a dynamic pressure:  
For high pressure (Type 1) taps 3±0.2 bar (0.3±0.02 MPa)  
OR  
For low pressure (Type 2) taps 0.1 ± 0.02 bar (0.01 ± 0.002 MPa)  
(BS EN 200:2008, sanitary tapware, single taps and combination taps for supply systems of type 1 and 2. General technical specifications)  
This includes any reductions achieved with flow restrictions. |
|--------------|--------------------------------------------------------------------------------------------------|
| Showers      | Flow rate of each shower at the outlet using cold water (T 30°C), in litres per minute measured a dynamic pressure:  
3 ± 0.2 bar (0.3 ± 0.02 MPa) for high pressure (Type 1) supply systems  
OR  
0.1 ± 0.05 bar (0.01 ± 0.005 MPa) for low pressure (Type 2) supply systems (BS EN 1112:2008). |
| Kitchen taps | Maximum flow rate litres/minute.                                                                |
| Baths        | Capacity to overflow in litres. Taps on baths should not be included in the calculation, as the water consumption from bath taps is taken into account in the use factor for baths. The calculation of water consumption for baths assumes 40% of the capacity to the overflow. This is to reflect that:  
1. Users tend not to fill the bath to overflow, and  
2. The displacement effect the user has on the actual volume of water required for a bath. |
| Dishwasher   | Litres/cycle for domestic applications or appliances or litres/rack for commercial applications or appliances. |
| Washing machine | Litres/use for domestic applications (for a typical wash cycle) or appliances or litres/kg for commercial applications or appliances, e.g. in hotels. |
| Waste disposal unit | Flow rate in litres/minute.                                                                  |

**Unspecified water-consuming components**

The methodology for awarding credits for water efficiency compares the buildings’ modelled water consumption performance against the performance of a baseline specification for the same component types. Therefore, where a component type is not specified it is not accounted for in the methodology, i.e. the component is excluded from both the proposed and baseline building. No benefit is gained in terms of BREEAM performance, by deciding not to specify a particular component. However, the methodology will reflect the reduction in overall water consumption (L/person/day) for the building, as a result of not specifying a particular component.

**Buildings with greywater or rainwater systems**

The following information is required where a greywater or rainwater system is specified:

**Rainwater:** In accordance with BS 85 15(175) ‘intermediate approach’:

1. Collection area (m²)
2. Yield co-efficient (%)
3. Hydraulic filter efficiency (%)
4. Rainfall (average mm/year).

**Rainwater:** In accordance with BS 85 15 ‘detailed approach’:

1. Daily rainfall collection (litres)

**Greywater:** in accordance with BS 85 25-1(176):

1. Manufacturer or system designer details.
2. The percentage volume of waste water collected (and reused) from the following (where relevant): wash-hand basins, showers, kitchen basins, dishwashers, baths, washing machines and sources of waste water from non-domestic components.
Where greywater or rainwater systems are specified, a minimum level of component efficiency must be achieved to award 4 or 5 BREEAM credits and the exemplary level credit. This is to avoid awarding a higher number of BREEAM credits where performance from less efficient fittings is offset by the specification of a greywater or rainwater collection system.

The intention behind this, is to ensure demand reduction is prioritised before offsetting consumption. Where a greywater or rainwater system is specified or installed, the component specification must achieve at least a 25% percentage reduction in water consumption (over the baseline specification) equivalent to 2 credits. Where this level is achieved, the total water demand met by greywater or rainwater sources can contribute to the overall percentage improvement required to achieve BREEAM credits. If this minimum is not achieved, the percentage of greywater or rainwater allowable will be equivalent to the percentage improvement in water consumption achieved for the component specification, i.e. percentage improvement on baseline performance.

For example, if a 20% improvement only is achieved, and therefore the building does not meet the 25% requirement, only 20% of the water demand met via greywater or rainwater sources can be used to offset water consumption from the micro-components. This minimum requirement does not apply where only 1, 2 or 3 credits are sought or where no greywater or rainwater system is specified, i.e. percentage improvement is based solely on the water efficiency of the micro-component specification.

BRE Global may allow some exemptions to this rule in instances where a particular fitting type requires a high flow rate due to specialised end user requirements, and its specification prevents compliance with the 25% improvement.

**Buildings with a mixture of different functional areas**

For the majority of buildings using the standard Wat 01 method, the BREEAM Wat 01 calculator defines the building type and range of different water-consuming activity areas within that building. For example, a retail development may contain sales area and goods storage or an office building may include a canteen and gym. However, where carrying out a single assessment of a building or development consisting of a diverse mix of activity areas or building types, each one of which can be assessed separately within the calculator, the following applies:

Determine the building’s total water consumption performance by carrying out separate assessments for each relevant activity area or building type. On completion of all the individual assessments, the assessor will need to determine the percentage improvement as follows:

\[
I = 100 \times \left[ 1 - \frac{(T_{1,Act} \times T_{1,OCC}) + \ldots + (T_{n,Act} \times T_{n,OCC})}{(T_{1,Base} \times T_{1,OCC}) + \ldots + (T_{n,Base} \times T_{n,OCC})} \right]
\]

where

- \(I\) = Overall improvement (%)
- \(T_{1,Act}\) = the modelled net water consumption (L/person/day) for each building type
- \(T_{n,Base}\) = the modelled baseline water consumption for the corresponding building type
- \(T_{n,OCC}\) = the total default occupancy rate for the corresponding building type

Where greywater or rainwater systems are specified, the assessor should take care to avoid unintended double counting of the yield from such systems and use it to offset demand for each activity area or building type.

**No fittings present**

Where a project under assessment contains none of the specified components, identify in the assessment the facilities most likely to be used by the occupants and visitors of the assessed building (e.g. specific facilities provided in a nearby accessible building). Conduct the calculations based on the performance specification of the components in those nearby facilities.

This rule also applies where a project under assessment consists solely of an extension to an existing building, i.e. where the extended building contains no new sanitary facilities because there are facilities present within the existing building.
Water consumption calculation for push and automatic shut-off taps

For input into the Wat 01 calculator, calculate the water consumption of push and automatic shut-off taps using the following steps:

Step 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: $9 \times \frac{15}{60} \times 2 = 4.5 \text{ litres/min}.$

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: $9 \times 20 \times \frac{1}{60} \times 1 = 3 \text{ litres/min}.$

Step 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, if we multiply 4.5 litres/min by 1.5 we get 6.75 litres/min. When this is used in the tool as the flow rate specification, the consumption is 4.57 L/person/day which more closely reflects the true level of water consumption for the push tap.

Flow rates for click taps present

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’.

Fixed water use

The BREEAM water efficiency calculation includes an allowance for fixed water use. This includes water consumption for vessel filling (for building users drinking water), cleaning in kitchens and food preparation in buildings with a catering facility. Fixed uses are included to provide greater accuracy in the reporting of the building’s overall estimated water consumption. As these uses are fixed for both actual and baseline building models, their totals do not influence the achievement of BREEAM credits.

Other permissible component demand for non-potable water

This BREEAM issue focuses on the performance of the building’s permanent domestic scale water-consuming components. Where a grey water or rainwater system is specified, the yield from the system should be prioritised for such uses, i.e. WC or urinal flushing. However, where the building demonstrates that it has other consistent (i.e. daily) and equivalent levels of non-potable water demand, and such demands are intrinsic to the building’s operation, then it is permissible for the demand from these non-domestic uses to be counted, i.e. the demand for rainwater or greywater yield from such systems or components can be used as well as, or instead of non-potable water demand from the building’s WC or urinal components. Examples of consistent and intrinsic demands could include laundry use in hotels and multi-residential developments or horticultural uses in garden centres, botanical gardens and golf courses. Demand for general landscaping and ornamental planting irrigation are not considered as equivalent or intrinsic by BREEAM.

Other permissible sources of non-potable water

The methodology allows for the collection and recycling of non-potable water from the relevant components listed in the criteria, i.e. taps, showers, baths and dishwashers or washing machines. In addition, where non-potable water is collected from a non-domestic component or source that is intrinsic to the building, then the amount collected can be accounted for in the methodology. This could include for example wastewater from active hygiene flushing, i.e. a regular hygiene flushing programme to minimise poor water quality in a potable cold or hot water system. In order for the method to account for this total, the design team needs to confirm to the assessor the yield from the component or system (in litres) and the frequency of that yield (in days), i.e. if once a week, the frequency would be seven days.
Evidence

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Interim design stage</th>
<th>Final post-construction stage</th>
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<tr>
<td>All</td>
<td>One or more of the appropriate evidence types listed in The BREEAM evidential requirements on page 38 can be used to demonstrate compliance with these criteria.</td>
<td>As per interim design stage</td>
</tr>
<tr>
<td>1</td>
<td>A completed copy of the BREEAM Wat 01 calculator</td>
<td>As per interim design stage</td>
</tr>
<tr>
<td>1</td>
<td>Documentary evidence supporting the data used to complete the calculator tool.</td>
<td>As per interim design stage</td>
</tr>
</tbody>
</table>

Definitions

BREEAM Wat 01 calculator for New Non-Domestic Buildings
The BREEAM Wat 01 calculator is a tool for the assessment of water efficiency in most common types of new non-domestic buildings. The calculator assesses the contribution that each domestic scale water-consuming component (as listed in the criteria) has on the building’s total water consumption. Please note, the calculator is a compliance tool and not a design tool for water demand and drainage systems. The tool uses default usage and occupancy rates to provide a benchmark of the typical consumption based on the specified fittings (in L/person/day and dm³/person/year) and their impact on the building’s overall water efficiency. Due to the impacts and differences of actual user behaviour and occupancy rates, the results of the method will not reflect directly the actual water use during building operation. The results from the methodology should, therefore, not be used for the purpose of comparison with or prediction of actual water consumption from a non-domestic building.

Clinical areas
Areas of the building in which medical functions are carried out that require specific restricted environmental conditions such as humidity, daylighting, temperature, etc. (e.g. X-ray, operating department, delivery room, etc.).

Domestic scale water-consuming components
Domestic scale components include kitchen taps, wash-hand basin taps, baths, showers and dishwashers, WCs, urinals, washing machines and waste disposal units. These components might consume potable or non-potable water.

Water fittings used for a process related function, e.g. laboratory or classroom taps, scrub-up taps, cleaners’ sinks etc., should be excluded from the assessment of water consumption for sanitary use.

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: \( (6 \text{ litre} \times 1) + (4 \text{ litre} \times 3) \div 4 = 4.5 \text{ litre} \) effective flushing volume (for a 6/4 dual flush WC)
– Domestic: \( (6 \text{ litre} \times 1) + (4 \text{ litre} \times 2) \div 3 = 4.67 \text{ litre} \) effective flushing volume (for a 6/4 dual flush WC)

The different 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.

**Greywater recycling**

The appropriate collection, treatment and storage of domestic wastewater (which is defined as that discharged from kitchens, baths or showers, laundry rooms and similar) to meet a non-potable water demand in the building, e.g. WC flushing, or other permissible non-potable use on the site of the assessed building.

**Potable water**

Water suitable for human consumption that meets the requirements of Section 67 (Standards of Wholesomeness) of the Water Industry Act 1991\(^{(177)}\) is referred to as ‘Wholesome water’.

**Non-potable water**

Any water other than potable water, also referred to as unwholesome water (BS 8525).

**Rainwater recycling**

The appropriate collection and storage of rainwater run-off from hard outdoor surfaces to meet a non-potable water demand in the building, e.g. WC flushing, or other permissible non-potable use on the site of the assessed building.

**Volume controller**

An automatic control device used to turn off the water supply once the maximum preset volume is reached within a defined period.

### Additional information

**European Water Label Scheme: Water efficiency label**

The European 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.

**Useful guidance**

The following list of documents may be useful:

– Water efficient product labelling scheme: www.water-efficiencylabel.org.uk
Wat 02 Water monitoring

Aim

To reduce the consumption of potable water in new buildings through the effective management and monitoring of water consumption.

Value

- Increasing awareness of water usage within the building.
- Identifying and monitoring large water uses and changed consumption levels to improve management and maintenance as well as to encourage reductions in unnecessary consumption.
- Reducing costs related to water consumption.
- Managing water demand for different building areas and uses.
- Reducing the need for large scale increases in water infrastructure in the future which are likely to increase costs over time as well as impact on our rural and urban landscapes and communities.

Context

Due to our increasing population densities and relatively high levels of water consumption, much of the UK is at risk of water shortages which are likely to increase over time as rainfall patterns change as a result of a changing climate. Reducing water consumption in the UK is, therefore, crucial.
Sub-metering water consumption means that water consumption can be better accounted for. Large water consumers can be identified with the aim to encourage the reduction of water use where practical. Moreover, changes in consumption can be identified and dealt with as appropriate, minimising risks of systems failures which can have costly and disruptive consequences.

**Assessment scope**

<table>
<thead>
<tr>
<th>Applicable Assessment criteria</th>
<th>Fully fitted</th>
<th>Simple building</th>
<th>Shell and core</th>
<th>Shell only</th>
</tr>
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<tr>
<td>Assessment type specific notes</td>
<td>None</td>
<td>None</td>
<td>All</td>
<td>1 and 3–5</td>
</tr>
</tbody>
</table>

**Assessment type specific**

1.0 Demonstrate compliance with criterion 2 for water-consuming plant or building areas identifiable by the developer. Do not assess water-consuming plant or building areas to be added or installed by the tenant. When the developer installs no water-consuming plants, the credit is awarded based on the rest of the criteria.

1.1 Minimum standard is applicable, however the assessor may, for speculative assessments, subject to their justification and evidence from the design team, seek for this to be reviewed by BRE Global.

1.2 Minimum standard is not applicable

**Building type specific**

2.0 For healthcare buildings and sites with multiple departments, e.g. large health centres or acute hospitals, fit separate sub-meters on the supply to the following areas where present:

- Staff and public areas
- Clinical areas and wards
- Letting areas: on the water supply to each tenant unit
- Laundries
- Main production kitchen
- Hydrotherapy pools
- Laboratories
- Central sterile supply department (CSSD), hospital sterilisation and disinfection unit (HSDU), pathology, pharmacy, mortuary and any other major process water use
- Supplementary supply of water from a cold water tank.
Wat 02 Water monitoring

Assessment criteria

One credit
1 Specify a water meter on the mains water supply to each building. This includes instances where water is supplied via a borehole or other private source.

2 For water-consuming plant or building areas consuming 10% or more of the building’s total water demand:
   2.a: fit easily accessible sub-meters
   OR
   2.b: install water monitoring equipment integral to the plant or area.

3 For each meter (main and sub):
   3.a: install a pulsed or other open protocol communication output
   AND
   3.b: connect it to an appropriate utility monitoring and management system, e.g. a building management system (BMS), for the monitoring of water consumption. If there is no BMS system in operation at Post-Construction stage, award credits provided that the system used enables connection when the BMS becomes operational.

4 In buildings with swimming pools, fit separate sub-meters on the water supply of the swimming pool and its associated changing facilities (toilets, showers etc.) irrespective of their water consumption levels.

5 In buildings containing laboratories, fit a separate water meter on the water supply to any process or cooling loop for ‘plumbed-in’ laboratory process equipment, irrespective of their water consumption levels.

Compliance notes
Compliance notes are located in Appendix G – Notes for compliance on page 18 for the consultation. These compliance notes will be available through the knowledge base when the scheme goes live.

Methodology

Sites with multiple units or buildings.
See criterion 2 above.

On sites with multiple units or buildings, e.g. shopping centres, industrial units, retail parks etc. fit separate sub meters on the water supply to the following areas (where present):
- Each individual unit supplied with water
- Common areas (covering the supply to toilet blocks)
No water supply to the building or unit - Extensions to existing buildings.

See criterion 2.a on the previous page

If no new water supply is installed, identify in the assessment the facilities most likely to be used by the occupants and visitors of the assessed building (e.g. specific facilities provided in a nearby accessible building). In this case, provide the following in this building:

1. A water meter for the mains water supply
2. Sub-meters for large water-consuming plant or facilities, e.g. evaporative cooling, swimming pool etc. (where present).

The meters provided must have a pulsed output or connection to existing BMS in accordance with the assessment criteria.

No additional monitoring benefit from sub-metering.

See criterion 2 on the previous page

Where the assessor confirms there is no additional monitoring benefit resulting from the installation of sub-meters, the requirement does not apply in the following cases:

- The building has only one or two small sources of water demand (e.g. an office with sanitary fittings and a small kitchen).
- 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 one.

Evidence

<table>
<thead>
<tr>
<th>Criteria</th>
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<td></td>
</tr>
</tbody>
</table>

Definitions

*Clinical areas*
Areas of the building in which medical functions are carried out that require specific restricted environmental conditions such as humidity, daylighting, temperature, etc. (e.g. X-ray, operating department, delivery room, etc.).

*Meter outputs*
Examples include pulsed outputs and other open protocol communication outputs, such as Modbus.

*Patient areas*
Areas of the building used mainly by inpatients (e.g. wards, dayrooms, etc.).
Staff areas
Areas of the building used mainly by staff (e.g. offices, meeting rooms, staff rooms) and medical areas where patients are admitted but that do not require restricted environmental conditions (e.g. consulting rooms, physiotherapy, etc.).

Utility monitoring and management system
Examples include automatic meter reading systems and building energy management systems. Automatic monitoring and targeting is an example of a management tool that includes automatic meter reading and data management.

Additional information

None
Wat 03 Water leak detection

Aim

To reduce the consumption of potable water in new buildings through minimising wastage due to water leaks.

Value

- Reducing potable water wastage associated with leaks.
- Minimising damage, costs and disruption arising from water leaks.
- Reducing costs related to water consumption.

Context

Water leakage within customers’ properties represents 6% of the total public water supply in England and Wales (178). This is equivalent to 25% of the total water leakage, with the rest being attributed to water distribution systems of the supply companies. Water leaks in building systems are responsible for major damage to property resulting in major disruption and costs. It is, therefore, important to ensure that water leaks are detected and controlled on a building level as early as possible.
Assessment scope

<table>
<thead>
<tr>
<th>Applicable Assessment criteria</th>
<th>Fully fitted</th>
<th>Simple building</th>
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<th>Shell only</th>
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<td>see ref 1.0 and 1.1</td>
<td>see ref 1.2</td>
<td>None</td>
</tr>
</tbody>
</table>

**Assessment type specific**

1.0 As an alternative to criteria 1 and 2, install automatic excess flow valves at relevant locations to protect property from damage caused by leaking pipes or tanks.

1.1 An automatic excess flow valve acts as a flow switch (‘fuse’) to automatically stop the flow of water and prevent uncontrolled release when the flow of water exceeds a predetermined rate (such as may occur in the event of failure of water supply pipes and tanks).

1.2 Assess the water supplies to WC areas or facilities as per criterion 3 regardless of whether the WC areas or facilities are fitted out or not.

**Building type specific**

2.0 **Healthcare** this issue does not apply to toilet facilities in clinical areas

2.1 **Multi-residential and guest accommodation** Flow control devices in WC areas or facilities are not required for ensuite facilities in residential areas, e.g. ensuite in individual bedrooms, a single bathroom for several individual bedrooms in halls of residence, key worker accommodation or sheltered accommodation. Occupants of this type of long-term residential accommodation have a sense of ownership and would identify and report a potential leak. Where only ensuite facilities are provided, the credit is filtered out of the assessment. However, the credit applies to buildings with guest bedrooms with ensuite facilities, e.g. hotel rooms, and communal WC areas or facilities, e.g. communal WC facilities in hotels, hostels and care homes.

2.2 For **Short term stay residential institutions** such as hotels, compliance with criterion 3 for WC facilities in hotel rooms can be achieved through providing the required flow control devices to groups of 10 rooms, rather than to each individual room.
Wat 03 Water leak detection

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 buildings, to detect any major leaks within the buildings.

   AND

   1.b: Between the buildings and the utilities water supply, to detect any major leaks between the utilities supply and the buildings under assessment.

2 The leak detection system is:
   2.a: A permanent automated water leak detection system that alerts the building occupants to the leak OR an inbuilt automated diagnostic procedure for detecting leaks.

   2.b: Activated when the flow of water passing through the water meter or data logger is at a flow rate above a pre-set maximum for a pre-set period of time. 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 part or the whole length of the water supply system.

   2.c: Able to identify different flow and therefore leakage rates, e.g. 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 different flow rates to enable it to be programmed to suit the building type and owner’s or occupier’s usage patterns.

   2.d: Programmable to suit the owner’s or occupier’s’ water consumption criteria.

   2.e: Where applicable, designed to avoid false alarms caused by normal operation of large water-consuming plant such as chillers.

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.

One credit - Flow control devices
3 Install flow control devices that regulate the supply of water to each WC area or facility according to demand, to minimise minor water leaks and wastage from sanitary fittings, which could otherwise be undetected.

Compliance notes
Compliance notes are located in Appendix G – Notes for compliance on page 18 for the consultation. These compliance notes will be available through the knowledge base when the scheme goes live.
Methodology

Flow control devices

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. The criteria are set to encourage the isolation of the water supply to each WC block when not in use.

The flow control criteria for this issue do 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).

Flow control devices include the following:

- 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 of the types of control elements listed above.

No water supply to the building or unit

Where a project under assessment contains no installed fittings and therefore there is no water supply to the building, identify and assess the facilities most likely to be used by the occupants and visitors of the assessed building (e.g. specific facilities provided in a nearby accessible building).

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.

Utilities water meters.

See criterion 1 on the previous page.

Where there is a utilities water meter at the site or building boundary, it may be necessary to install a separate flow meter (or alternative measurement system) just after the utilities water meter to detect leaks. However, if the water utilities company agrees to some form of leak detection being installed on their meter, this would also be acceptable.
Evidence

<table>
<thead>
<tr>
<th>Criteria</th>
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</tbody>
</table>

Definitions

**Clinical areas**
Areas of the building in which medical functions are carried out that require specific restricted environmental conditions such as humidity, daylighting, temperature, etc. (e.g. X-ray, operating department, delivery room, etc.).

**WC areas or facilities**
WC areas or facilities refer to the 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 hot-water scalding.

Additional information

None
Wat 04 Water efficient equipment

Aim

To reduce water consumption for uses not assessed under Wat 01 by encouraging specification of water efficient equipment.

Value

- Reducing potable water use in high consumption equipment and associated energy consumption.
- Reducing costs related to water consumption and water heating.
- Promoting innovation and manufacture of more water efficient equipment.

Context

Water consumption associated to non-domestic scale, non-sanitary water uses can be very significant depending on the building type and relevant uses. Industrial processes and other project-specific processes do not always require water to be treated to potable quality. Therefore there is scope to adopt more imaginative solutions to meeting this demand through alternative sources, reuse or recycling solutions which are often project-specific.
With the predicted higher climatic temperatures and drier summers, the need for irrigation is likely to increase in the UK, impacting on our ability as a society to provide adequate water supplies at a reasonable cost.

Therefore, there is a need to address these types of water uses, encouraging reductions in potable water consumption.

**Assessment scope**

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<thead>
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<tbody>
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<td>None</td>
<td>All</td>
<td>All</td>
</tr>
<tr>
<td>Assessment type specific notes</td>
<td>None</td>
<td>None</td>
<td>see ref 1.0</td>
<td>see ref 1.0</td>
</tr>
</tbody>
</table>

**Assessment type specific**

1.0 Where the only non-domestic, non-sanitary water demand comes from an irrigation system specified or installed by the developer, then use this system to assess compliance.

**Building type specific**

None
Wat 04 Water efficient equipment

Assessment criteria

One credit
1. Identify all water demands from uses other than those listed under Wat 01 Water consumption on page ccb that could be realistically mitigated or reduced. Where there is no water demand from uses other than domestic-scale, sanitary use components in the building, this issue is not applicable.
2. Identify systems or processes to reduce the relevant water demand (criterion 1 above), and establish, through either good practice design or specification, a demonstrable reduction in the total water demand of the building.

Compliance notes
Compliance notes are located in Appendix G – Notes for compliance on page 18 for the consultation. These compliance notes will be available through the knowledge base when the scheme goes live.

Methodology
None.

Evidence

<table>
<thead>
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</tr>
</tbody>
</table>

Definitions

Non-domestic scale, non-sanitary water uses
For the purposes of this BREEAM Issue, non-domestic scale, non-sanitary water uses refer to any water uses not assessed under Wat 01. This includes, but is not limited to the following:
– swimming pools
– recreational hot tubs and hydrotherapy pools
– equipment used for irrigation
– vehicle wash equipment
– project-specific industrial processes
– building services (e.g., boilers, cooling towers and humidification systems).

**Vehicle wash**

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

15% Fully fitted
18% Simple building
18% Shell & core
21.5% Shell only

Summary

This category encourages decisions which reduce the environmental and social impact of construction products used on a project. It takes a 'whole life cycle' approach to construction product impacts, encouraging consideration of impacts during manufacture, design, procurement, installation, in-use and end-of-life. The issue focuses on construction product efficiency, environmental impact, responsible sourcing and product durability.

Mat 01 Environmental impacts from construction products - Building life cycle assessment on page 287
- Reducing buildings’ environmental life cycle impacts through conducting Life Cycle Analysis and integrating its outcomes in the design decision-making process.

Mat 02 Environmental impacts from construction products on page 302 1 credit
- Encouraging the reduction of environmental life cycle impacts through rewarding the specification of products with a recognised environmental product declaration. Encouraging the reduction of environmental life cycle impacts through rewarding the specification of products with a recognised environmental product declaration.

Mat 03 Responsible sourcing of materials on page 307 4 credits
- Recognising and encouraging responsible sourcing of construction materials. This includes the source of products and the intermediary companies processing and transport of the product to site.

Mat 05 Designing for durability and resilience on page 319 1 credit
- Increasing the lifespan of the building through designing for durability and protection from degradation and specifying appropriate construction products.

Mat 06 Material efficiency on page 325
- Encouraging the reduction of environmental impacts through optimising the use of materials during all stages of the project.
Aim

To reduce the burden on the environment from construction products by recognising and encouraging measures to optimise construction product consumption efficiency and the selection of products with a low environmental impact (including embodied carbon), over the life cycle of the building.

Value

- Help project teams to understand the overall environmental impact of the building design.
- Ensure that all life cycle greenhouse gas emissions are taken into account in the design, not just operational emissions.
- Reduce the impact of the construction industry and construction product industries.
- Assess the environmental impacts at the building level to provide flexibility when specifying materials and components, to take into account project specific conditions and priorities.
- Allow optimal solutions to be identified and adopted to reduce overall environmental impacts arising from materials use.

Context

The use of construction materials leads to a wide range of environmental and social impacts across the life cycle through initial procurement, wastage, maintenance and replacement. Taken together, construction products make
a highly significant contribution to the overall life cycle impacts of a building. In some cases they may even outweigh operational impacts (such as energy consumption).

The introduction of Part L into the building regulations has led to reductions in the operational energy consumption of buildings which are being progressively tightened. As a result, greenhouse gas emissions from other aspects of buildings, such as embodied emissions, are becoming increasingly important in terms of reducing the overall emissions, resulting from the procurement, maintenance and replacement of materials over the buildings life, that lead to climate change.

In addition to climate change, there are several other embodied environmental impacts associated with construction products and the processes that occur during and after construction that should be considered during design, for example CSR and other regulatory obligations.

### Assessment scope

<table>
<thead>
<tr>
<th>Fully fitted</th>
<th>Simple building</th>
<th>Shell and core</th>
<th>Shell only</th>
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<td>1.1, 1.2</td>
<td>1.0, 1.1, 1.2</td>
<td>1.1, 1.2</td>
</tr>
</tbody>
</table>

#### Assessment type specific

1.0 **Simple buildings**
   - All criteria relevant to the building type and function apply except criteria 1 to 2 on page 289.

1.1 **Mixed use buildings**
   - Where a single building use type accounts for ≥ 50% of the net internal floor area, all criteria relevant to the building type and function apply. Where < 50%, all criteria relevant to the building type and function apply except criteria 1 to 2 on page 289.

1.2 **Part new-build, part refurbishments**
   - All criteria relevant to the building type and function apply except criteria 1 to 2 on page 289.

#### Building type specific

None
Mat 01 Environmental impacts from construction products - Building life cycle assessment

Assessment criteria

Seven credits (see criteria 1 to 7) and three exemplary credits (see criteria 8 to 18) are available in this issue. Some credits require preceding criteria to be fulfilled first.

Credits for building Life Cycle Assessment (LCA) of the superstructure (criteria 1 to 5) are awarded as a combined total. Of these, credits for LCA benchmarking of the superstructure (criteria 1 to 2) are only applicable to offices, industrial and retail buildings.

For other building types, the same number of credits are available for LCA options appraisal alone (criteria 3 to 5). For further details, please see Table 44 on page 291.

Building LCA comparison with the BREEAM benchmark

Superstructure (offices, industrial and retail buildings (except for Simple Buildings and where Notes 1.1 and 1.2 on page 288 apply)

1. During RIBA stage 2 ‘Concept design’, carry out a building LCA on of the superstructure design and compare the results with the benchmark to demonstrate environmental impact performance, as follows:
   1.a: Using either the BREEAM Simplified building LCA tool or an IMPACT Compliant LCA tool.
   1.b: The scope of the assessment shall include the building elements indicated in Mat 01 Environmental impacts from construction products - Building life cycle assessment Assessment scope on page 288, where present in the building.
   1.c: The building LCA tool and LCA shall fulfill the quality requirements shown in Table 48 on page 297.
   1.d: The results from the building LCA tool and other required information shall be entered into the Mat 01 Results Submission Tool. The Mat 01 Results Submission Tool will calculate the number of credits awarded.
   1.e: The Mat 01 Results Submission Tool shall be submitted to BRE Global before the end of RIBA stage 2, and before planning permission is applied for (that includes external material or product specifications).

2. At the end of RIBA stage 4 (technical design), using the same tool as used for the RIBA stage 2 submission, update the building LCA of the superstructure design and recompute the results with the benchmark, as follows:
   2.a: As criteria 1.c 1.b to 1.d 1.e
   2.b: The Mat 01 Results Submission Tool shall be submitted to BRE Global at the end of RIBA stage 4.

Building LCA option appraisal at RIBA stage 2 – Superstructure

3. For offices, industrial and retail building types, criterion 1 is achieved (except where Simple buildings or where Notes 1.1 and 1.2 on page 288 apply).

4. During RIBA stage 2 ‘Concept design’, carry out building LCA options appraisal of 2 to 4 significantly different superstructure design options to identify reductions in environmental impacts, as follows:
   4.a: Using a building LCA tool as defined in criterion 1.a or another building LCA tool recognised by BREEAM as suitable for assessing superstructure at RIBA stage 2.
4.b: As criteria 1.b to 1.d

4.c: Each design option shall fulfil the same functional requirements by the client and statutory requirements (to ensure functional equivalency).

4.d: The building LCA activity shall be integrated within the wider design decision-making process.

4.e: An LCA options appraisal report shall be produced by the project design team that enables the design team and client to make better informed decisions on the different design options. The LCA options appraisal report shall provide information on the environmental impacts of each design option along with the effect, if any, on other relevant factors such as (but not necessarily limited to) capital cost and delivery times (life cycle cost integration is rewarded by criteria 10 to 14). The LCA options appraisal report shall be reviewed by the design team and client.

4.f: Prior to submission, the following shall be recorded in the Mat 01 Results Submission Tool. The differences between the design options; the design option selected by the client to be progressed beyond the current RIBA stage; the reasons for selecting it and the reasons for not selecting the other design options.

4.g: As criterion 2.b.

If the building LCA tool recognised by BREEAM used for criteria 3 to 7 (and 8 to 9, if pursued) is not an IMPACT Compliant LCA tool and criteria 4 to 2 are applicable, then the BREEAM Simplified building LCA tool (or an IMPACT Compliant LCA tool) shall be used for criteria 1 to 2.

Building LCA options appraisal at RIBA stage 4 - Superstructure

5 During RIBA stage 4 'Technical design', carry out building LCA options appraisal of 2 to 3 significantly different superstructure design options to identify further reductions in environmental impacts, as follows:

5.a: Using either an IMPACT Compliant LCA tool or another building LCA tool recognised by BREEAM as suitable for assessing superstructure at RIBA stage 4.

5.b: As criteria 4.b to 4.f. Where an options appraisal report was produced at RIBA stage 2, it is updated to include the RIBA stage 4 design options.

5.c: As criterion 2.b.

Building LCA options appraisal at RIBA stage 2 - Substructure and hard landscaping

6 Criteria 3 and 4 are achieved.

7 During RIBA stage 2 'Concept design', carry out building LCA options appraisal of a combined total of at least 6 significantly different substructure or hard landscaping design options (at least two shall be substructure and at least two shall be hard landscaping) to identify reductions in environmental impacts, as follows:

7.a: Using a building LCA tool recognised by BREEAM as suitable for assessing substructure and hard landscaping.

7.b: As criteria 4.b to 4.g

Hard landscaping that is within a defined curtilage of the building or is clearly more associated with it rather than any other building shall be included. Hard landscaping with no such distinction shall be excluded.

Exemplary level criteria

To achieve exemplary performance credits

Building LCA options appraisal at RIBA stage 2 - Core building services

8 Criteria 3 to 4 are achieved.

9 During RIBA stage 2 'Concept design', carry out building LCA options appraisal of at least 3 significantly different core building services design options to identify reductions in environmental impacts, as follows:
9 a: Using a building LCA tool recognised by BREEAM as suitable for assessing core building services.

9 b: As criteria 4 b to 4 g.

**Building LCA options appraisal - LCA and LCC alignment**

10 Achieve criteria 3 to 5.

11 Achieve Elemental LCC plan and Component Level LCC options appraisal credits (Man 02 Life cycle cost and service life planning on page 44).

12 The design options appraised for criteria 3 to 4 (and 6 to 7 and 8 to 9, if pursued) at RIBA stage 2 are included in the 'elemental LCC plan' in issue 'Man 02 Life cycle cost and service life planning'.

13 The design options appraised for criteria 5 at RIBA stage 4 are included in the 'Component level LCC option appraisal' in (Man 02 Life cycle cost and service life planning on page 44).

14 The relevant cost information from the 'elemental LCC plan' and 'Component level LCC option appraisal' shall be summarised in the LCA options appraisal report to enable the client and design team to make better informed decisions at the relevant stages given in criteria 3 to 5 (and 6 to 7 and 8 to 9, if pursued).

**Building LCA - Third party verification**

15 Criteria 1 to 7 (as applicable to the building type) are achieved.

16 A suitably qualified 3rd party (see Definitions on page 294) shall either carry out the building LCAs or produce a report verifying the building LCAs accurately represent the designs under consideration at RIBA stages 2 and 4 with reference to the requirements of criteria 1 to 7 (and 8 to 14 if pursued).

17 For each LCA option, the report shall itemise the findings of the verification checks made by the suitably qualified 3rd party including, as a minimum, the quality requirements show in Table 48 on page 297.

18 The report shall include details of their relevant skills and experience and a declaration of their 3rd party independence from the project client and design team.

**Credit Summary**

Table 44 sets out the allocation of credits for the criteria above. The actual credits achieved in an assessment is calculated by the Mat 01 Results Submission Tool.

Table 44 Credit summary table

<table>
<thead>
<tr>
<th>Description</th>
<th>RIBA stage</th>
<th>Applicable Criteria</th>
<th>Credits available</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Where BREEAM benchmark available **</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>[Prerequisite criteria shown in brackets]</td>
</tr>
<tr>
<td>Building LCA comparison with the BREEAM benchmark – Superstructure</td>
<td>2 and 4</td>
<td>1 to 2</td>
<td>Up to 2 [None]</td>
</tr>
<tr>
<td>Building LCA option appraisal</td>
<td>Superstructure</td>
<td>2 only</td>
<td>3 to 4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4 only</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>2 and 4</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Substructure and hard landscaping</td>
<td>2</td>
<td>6 to 7</td>
<td>1 [3 to 4]</td>
</tr>
<tr>
<td>Core building services</td>
<td>2</td>
<td>8 to 9</td>
<td>1 exemplar [3 to 4]</td>
</tr>
<tr>
<td>Building LCA option appraisal - LCA and LCC alignment</td>
<td>2 and 4</td>
<td>10–14</td>
<td>1 exemplar [3 to 5]</td>
</tr>
</tbody>
</table>
### Compliance notes

Compliance notes are located in Appendix G – Notes for compliance on page 18 for the consultation. These compliance notes will be available through the knowledge base when the scheme goes live.

### Methodology

**Building LCA comparison with the BREEAM benchmark and building LCA option appraisal**

Criteria 1 to 9.

**Method using the BREEAM Simplified building LCA tool**

Step 1: Identify the elements that are present in the building and are in -scope, based on Mat 01 Environmental impacts from construction products - Building life cycle assessment. 

Step 2: In the BREEAM Simplified building LCA tool, for the elements identified in step 1 only, select the elemental construction description that is the most similar to the actual elemental construction. If an element has more than one type of construction, then select an elemental construction for each type.

Step 3: For each of the elemental constructions, enter the total quantity in the building. Enter any further information required by the tool. Ensure that the quality requirements are adhered to (see Table 48 on page 297).

Step 4: A total EcoPoint result is generated by the BREEAM Simplified building LCA tool.

Step 5: Enter the total BRE EN EcoPoints result into the Mat01 Results Submission Tool. Enter any further information required by the tool. The Mat 01 Results Submission Tool will calculate the credit award for the building.

**Method using an IMPACT Compliant LCA tool or another building LCA tool recognised by BREEAM**

Step 1: Identify the elements that form the building and are in scope, based on Mat 01 Environmental impacts from construction products - Building life cycle assessment. 

Step 2: Using a building LCA tool that is recognised by BREEAM (see The Mat 01 Results Submission Tool), produce a building LCA model. Ensure as a minimum that all the in -scope elements are included. Ensure that the quality requirements are adhered to (see Table 48 on page 297).
Step 3: Obtain the LCA results for the building from the tool only for the in-scope elements. Enter the results into the Mat 01 Results Submission Tool. Enter further information required by the tool including (but not necessarily limited to) construction and product descriptions, quantities, service lives, transport distances, classifications and justification for design decisions. The Mat 01 Results Submission Tool will calculate the credit award for the building.

Depending on the functionality of the building LCA tool, the information required may be readily exportable for importing into the Mat 01 Results Submission Tool.

Significantly different design options

Submitted design options that are significantly different in terms of either the types of or quantity of construction products specified for one or more major elemental constructions that are within the scope of the assessment. This will depend on the stage of the assessment.

At Concept Design (RIBA stage 2), significantly different options are typically at the elemental construction level, for example:

- For the majority of the element ‘1. External enclosing walls above ground floor level’, option ‘A’ has a timber cladding external finish and option ‘B’ has cement render (each will likely have different substrates accordingly).
- For element ‘2. Superstructure/1. Frame’, option ‘A’ is a concrete based frame and option ‘B’ is a steel based frame.
- For element ‘2. Superstructure/1. Frame’, option ‘A’ is a cast in-situ concrete based frame and option ‘B’ is a precast concrete based frame.
- For ‘5. Central heating and cooling’, option ‘A’ is a refrigerant distribution based system and option ‘B’ is an air distribution based system.

At Technical Design (RIBA stage 4), significantly different options are typically at the product level (within elemental constructions established at RIBA stage 2), for example:

- For the element ‘1. External enclosing walls above ground floor level’, where both options have cement render but ‘A’ is a different type of render from ‘B’.
- For the element ‘3. Roof’, option ‘A’ has a one type of insulation and option ‘B’ has another type of insulation.
- For ‘5. Central heating and cooling’, the pipework manufacturer for option ‘A’ is different from option ‘B’.

The Mat 01 Results Submission Tool contains functionality to assist in determining if the options are significantly different.

Evidence

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Interim design stage</th>
<th>Final post-construction stage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1–2</td>
<td>At RIBA stage 2</td>
<td>As per interim design stage (updated)</td>
</tr>
<tr>
<td></td>
<td>– The Mat 01 Results Submission Tool</td>
<td></td>
</tr>
<tr>
<td>3–4</td>
<td>At RIBA stage 2</td>
<td>As per interim design stage</td>
</tr>
<tr>
<td></td>
<td>As criteria 1 to 2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>– The LCA options appraisal report</td>
<td></td>
</tr>
<tr>
<td></td>
<td>– Evidence that the LCA options appraisal report has been reviewed by the design team and client (meeting minutes, letter of acknowledgement)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>– Evidence of how the LCA design options have been integrated into the wider design process (e.g. meeting minutes, documented design development showing how the LCA</td>
<td></td>
</tr>
<tr>
<td>Criteria</td>
<td>Interim design stage</td>
<td>Final post-construction stage</td>
</tr>
<tr>
<td>----------</td>
<td>----------------------</td>
<td>------------------------------</td>
</tr>
<tr>
<td>5</td>
<td>At RIBA stage 4</td>
<td></td>
</tr>
<tr>
<td></td>
<td>– As criteria 3 to 4</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(updated)</td>
<td>As per interim design stage</td>
</tr>
<tr>
<td>6–7</td>
<td>At RIBA stage 2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>– As criteria 3 to 4</td>
<td></td>
</tr>
<tr>
<td></td>
<td>– The LCA options appraisal report includes core building services according to the criteria.</td>
<td>As per interim design stage</td>
</tr>
<tr>
<td>8–9</td>
<td>At RIBA stage 2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>– As criteria 3 to 4</td>
<td></td>
</tr>
<tr>
<td></td>
<td>– The LCA options appraisal report includes substructure and hard landscaping according to the criteria.</td>
<td>As per interim design stage</td>
</tr>
<tr>
<td>10–14</td>
<td>At RIBA stage 4</td>
<td></td>
</tr>
<tr>
<td></td>
<td>– As criteria 5</td>
<td></td>
</tr>
<tr>
<td></td>
<td>– The 'elemental LCC plan' and 'Component level LCC option appraisal; in issue 'Man 02 Life cycle cost and service life planning'.</td>
<td>As per interim design stage</td>
</tr>
<tr>
<td>15–18</td>
<td>The third party's report:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>– Verifying the building LCAs accurately represent the designs under consideration.</td>
<td>As per interim design stage</td>
</tr>
<tr>
<td></td>
<td>– Itemising the findings of their verification checks.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>– Evidence that the requirements of a suitably qualified third party are fulfilled.</td>
<td></td>
</tr>
</tbody>
</table>

**Definitions**

**Building LCA tools recognised by BREEAM**

Building LCA tools that have been technically evaluated by BRE Global are recognised as suitable for carrying out building LCA on one or more of the credits in this issue (e.g. superstructure; substructure and hard landscaping; building services). A list of recognised tools, and the credits they are considered suitable for, can be found in the Mat01 Results Submission Tool.

Building LCA tools that are recognised as having fewer environmental categories will have a credit cap (fewer than: CO₂e AND either water or waste processing AND at least 2 other categories).

Where a project team is considering using a building LCA tool that is not listed in the Mat01 Results Submission Tool, the assessor should contact BRE Global as soon as possible to initiate the evaluation process. The evaluation process will require the involvement and issue of evidence by the tool owner. The fee sheet on the assessor extranet provides details of fees for LCA tool evaluations.
BREEAM Simplified building LCA tool

The BREEAM Simplified building LCA tool is an elemental construction level LCA tool that is free to use by BREEAM Assessors and design team members working on a registered BREEAM assessment for this issue. The tool has been designed to simplify LCA by reducing the information that needs to be entered by the user and the amount of time required.

The accuracy of the results produced by the tool are appropriate for criteria 1 to 2. However, for criteria 3 to 4 the results are less appropriate than the other LCA tools recognised by BREEAM. As such, the credits awarded for criteria 3 to 4 when using this tool will have a credit cap.

BRE EN EcoPoints

BRE EN EcoPoints are an indicator that is made up of broad set of individual environmental indicators which are then combined into a single value. For more information about BRE EN EcoPoints, visit www.bre.co.uk or contact BRE.

Core building services

Building services components or elements that are part of the building-wide system, rather than a specific tenant or space (local building services).

Credit cap

The total number of credits that the tool can be awarded is less than the total number of credits available because the tool is technically inferior to uncapped tools. For example, fewer environmental indicators are reported or the requirements on data entered by the user are less detailed. The Mat01 Results Submission Tool indicates which tools have a credit cap.

Functional requirements

The functional requirements are normally determined by the project client at RIBA stage 1 with the help of the design team. They define the required functional properties such as the activities that the building will be used for, usable floor area, design life, budget, sustainability targets etc. The functional requirements exclude any requirements that only relate to visual or other non-functional preference.

If the client has not set formal functional requirements, the design team shall determine functional requirements that reasonably serve the client’s needs as far as they are understood.

IMPACT (Integrated Material Profile And Costing Tool)

IMPACT is a specification and database for software developers to incorporate into their tools to enable consistent LCA and LCC. IMPACT compliant tools work by allowing the user to attribute environmental and cost information to drawn or scheduled items in the BIM. Further information about IMPACT is available from www.impactwba.com.

IMPACT Compliant LCA tool

An IMPACT Compliant tool is a tool that has been tested for compliance with the IMPACT specification, and is listed here: www.impactwba.com.

Mat01 Results Submission Tool

The Mat01 Results Submission Tool provides a standardised way for BRE Global to collect information for this issue. In addition, it can be used by those who do not have access to the building LCA tool to compare what is modelled with other sources of design information (bills of quantities, drawings, specifications etc.), and see the breakdown of environmental impacts. In addition, the data in the tool may be used by BRE Global for updating the BREEAM benchmarks and for other research activities (in a way that is not attributable to individual buildings).
New Rules of Measurement (NRM)

NRM provides a standard set of measurement rules and essential guidance for the cost management of construction projects and maintenance works. For more information visit www.rics.org. IMPACT Compliant LCA tools currently use NRM classification as a default.

Suitably qualified third party

An individual who:

- is a third party
- has received training on using the building LCA tool that is recognised by the tool supplier, and has passed the associated tests or exams (if any).
- has completed building LCA for at least three projects for paying customers in the last two years.
- is able to interpret construction documentation (drawings, specifications, schedules etc.), which may be evidenced by a suitable construction related qualification or relevant experience.

Third party

A person or body that is recognised as being independent of the parties involved (parties involved are typically a supplier (1st party) or purchaser (2nd party), as concerns the issue in question.

Checklists and tables

Scope of assessment

The following tables indicates the level 3 sub-elements that shall be included in the scope of the building LCA. Inclusion of the in scope sub-elements is necessary to ensure an appropriate level of comparability between assessments. All other sub-elements shall be ignored for the purposes of the BREEAM LCA. For tables showing sub-elements that shall be excluded see ‘Out of scope elements’ within ‘Additional Information’.

If a sub-element is not present in the building, it does not need to be included. If a particular sub-element appears to be associated with more than one classification, the classification with the strongest association shall be used. If a particular sub-element appears to be associated with an in scope classification and an out of scope classification, it shall be classified under the in scope classification (and included in the assessment).

If the BREEAM Simplified building LCA tool is used, the constructions available in the tool may cover more than one item identified in the tables below. A completed BREEAM Simplified building LCA tool (that includes one or more constructions for each building element identified as present in the building) is compliant with these scope requirements.

In addition, the table shows the classification codes that shall be used in the BREEAM Simplified building LCA tool, based on the RICS New Rules of Measurement (NRM) classification system. For example, the code for ‘Standard foundations’ is ‘1.1.1’.

Table 45 Superstructure – in scope (criteria 1 to 5)

<table>
<thead>
<tr>
<th>Level 1 Group element</th>
<th>Level 2 Element</th>
<th>Level 3 Sub-element</th>
</tr>
</thead>
<tbody>
<tr>
<td>2. Superstructure</td>
<td>1. Frame</td>
<td>1. Steel frames</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2. Space decks</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3. Concrete casings to steel frames</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4. Concrete frames</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5. Timber frames</td>
</tr>
<tr>
<td></td>
<td></td>
<td>6. Other frame systems</td>
</tr>
<tr>
<td>2. Upper floors</td>
<td></td>
<td>1. Floors</td>
</tr>
<tr>
<td>3. Roof</td>
<td></td>
<td>1. Roof structure</td>
</tr>
</tbody>
</table>
Table 46 Substructure and hard landscaping – In scope (applicable to criteria 6 and 7)

<table>
<thead>
<tr>
<th>Level 1 Group element</th>
<th>Level 2 Element</th>
<th>Level 3 Sub-element</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>2. Specialist foundation systems</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3. Lowest floor construction</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4. Basement excavation</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5. Basement retaining walls</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2. Special surfacings and pavings</td>
</tr>
</tbody>
</table>

Table 47 Core building Services – In scope (applicable to criteria 8 and 9)

<table>
<thead>
<tr>
<th>Level 1 Group element</th>
<th>Level 2 Element</th>
<th>Level 3 Sub-element</th>
</tr>
</thead>
<tbody>
<tr>
<td>5. Services</td>
<td>5. Heat source</td>
<td>1. Central heating</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2. Central cooling</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3. Central heating and cooling</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4. Central air-conditioning</td>
</tr>
<tr>
<td>6. Space heating and Air-conditioning</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Ventilation</td>
<td>1. Central ventilation</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2. Smoke extract or control</td>
<td></td>
</tr>
<tr>
<td>9. Fuel installations and systems</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1. Fuel storage</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2. Fuel distribution systems</td>
<td></td>
</tr>
</tbody>
</table>

Quality requirements

The LCA fulfils the following requirements at the relevant RIBA stage.

Table 48 LCA Quality requirements

<table>
<thead>
<tr>
<th>Item</th>
<th>At RIBA stage 2 submission</th>
<th>At RIBA stage 4 submission</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elemental construction quantities</td>
<td>± 10% of quantities shown in design documents</td>
<td></td>
</tr>
<tr>
<td>LCA or EPD data type</td>
<td>Generic or manufacturer specific. Use the closest matching data in the tool</td>
<td></td>
</tr>
<tr>
<td>Product quantities (mass per unit of elemental construction)</td>
<td>Typical or generic values Generic (non-project specific) elemental constructions may be used.</td>
<td>± 10% of quantities shown in design documents. All elemental constructions shall must be created from</td>
</tr>
<tr>
<td>Product transport distances</td>
<td>Individual products.</td>
<td></td>
</tr>
<tr>
<td>----------------------------</td>
<td>----------------------</td>
<td></td>
</tr>
<tr>
<td>Product service lives and site wastage</td>
<td>Typical or generic values. Project specific distances may be used where known.</td>
<td></td>
</tr>
<tr>
<td>Adhesives</td>
<td>A reasonable estimate for the actual installation scenario.</td>
<td></td>
</tr>
<tr>
<td>Adhesives</td>
<td>Excluded if the adhesive is applied to less than 20% of the product’s surface</td>
<td></td>
</tr>
<tr>
<td>Minor fixings (e.g. brackets, nails, screws), sealants and ironmongery items</td>
<td>Excluded</td>
<td></td>
</tr>
<tr>
<td>Minor fixings (e.g. brackets, nails, screws), sealants and ironmongery items</td>
<td>Excluded</td>
<td></td>
</tr>
<tr>
<td>Study period</td>
<td>Results reported separately for each environmental indicator, for each EN 15978:2011 module as follows:</td>
<td></td>
</tr>
<tr>
<td>Study period</td>
<td>– Stage A: A1, A2 and A3 (may be combined).</td>
<td></td>
</tr>
<tr>
<td>Study period</td>
<td>– Stage B: Separately, each module possible in the building LCA tool (see definition Building LCA tools recognised by BREEAM)</td>
<td></td>
</tr>
<tr>
<td>Study period</td>
<td>– Stage C: As stage B</td>
<td></td>
</tr>
<tr>
<td>Study period</td>
<td>60 years</td>
<td></td>
</tr>
<tr>
<td>Study period</td>
<td>60 years</td>
<td></td>
</tr>
<tr>
<td>Results reported</td>
<td>Results reported separately for each environmental indicator, for each EN 15978:2011 module as follows:</td>
<td></td>
</tr>
<tr>
<td>Results reported</td>
<td>– Stage A: A1, A2 and A3 (may be combined).</td>
<td></td>
</tr>
<tr>
<td>Results reported</td>
<td>– Stage B: Separately, each module possible in the building LCA tool (see definition Building LCA tools recognised by BREEAM)</td>
<td></td>
</tr>
<tr>
<td>Results reported</td>
<td>– Stage C: As stage B</td>
<td></td>
</tr>
</tbody>
</table>

**Out of scope elements**

The following tables indicates the building sub-elements that shall be excluded from the scope of the building LCA.

In addition, the table shows classification codes based on the RICS New Rules of Measurement (NRM) classification system. For example, the code for ‘Standard foundations’ is ‘1.1.1’.

**Table 49** Superstructure – Out of scope

<table>
<thead>
<tr>
<th>Level 1 Group element</th>
<th>Level 2 Element</th>
<th>Level 3 Sub-element</th>
</tr>
</thead>
<tbody>
<tr>
<td>2. Superstructure</td>
<td>2. Upper Floors</td>
<td>2. Balconies</td>
</tr>
<tr>
<td></td>
<td>3. Roof</td>
<td>6. Roof features</td>
</tr>
<tr>
<td></td>
<td>4. Stairs and Ramps</td>
<td>2. Stair or ramp finishes</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3. Stair or ramp balustrades and handrails</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4. Ladders, chutes, slides</td>
</tr>
<tr>
<td></td>
<td>5. Subsidiary walls, balustrades, handrails, railings and proprietary balconies</td>
<td>5. External walls</td>
</tr>
<tr>
<td></td>
<td>6. Façade access or cleaning systems</td>
<td>6. Subsidiary walls, balustrades, handrails, railings and proprietary balconies</td>
</tr>
<tr>
<td>8. Internal Doors</td>
<td>2. Internal doors</td>
<td>8. Internal Doors</td>
</tr>
<tr>
<td>3. Internal finishes</td>
<td>1. Wall finishes</td>
<td>1. Finishes to walls</td>
</tr>
<tr>
<td></td>
<td>2. Floor finishes</td>
<td>1. Finishes to floors</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2. Raised access floors</td>
</tr>
<tr>
<td></td>
<td>3. Ceiling finishes</td>
<td>3. Ceiling finishes</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1. Finishes to ceilings</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2. False ceilings</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3. Demountable suspended</td>
</tr>
</tbody>
</table>

**Table 50** Substructure and hard landscaping – Out of scope

<table>
<thead>
<tr>
<th>Level 1 Group element</th>
<th>Level 2 Element</th>
<th>Level 3 Sub-element</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>5. External Fixtures</td>
<td>1. Site or Street furniture and equipment 2. Ornamental features</td>
</tr>
</tbody>
</table>

**Table 51** Core building Services – Out of scope

<table>
<thead>
<tr>
<th>Level 1 Group element</th>
<th>Level 2 Element</th>
<th>Level 3 Sub-element</th>
</tr>
</thead>
<tbody>
<tr>
<td>2. Superstructure</td>
<td>2. Upper Floors</td>
<td>3. Drainage to balconies</td>
</tr>
<tr>
<td></td>
<td>3. Roof</td>
<td>4. Roof drainage</td>
</tr>
<tr>
<td></td>
<td>2. Services Equipment</td>
<td>1. Services Equipment</td>
</tr>
<tr>
<td>8. Local air-conditioning</td>
<td></td>
<td></td>
</tr>
<tr>
<td>--------------------------</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Ventilation</td>
<td>2. Local and special ventilation</td>
<td></td>
</tr>
<tr>
<td>8. Electrical Installations</td>
<td>1. Electrical mains and sub-mains distribution</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2. Power installations</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3. Lighting installations</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4. Specialist lighting installations</td>
<td></td>
</tr>
<tr>
<td></td>
<td>5. Local electricity generation systems</td>
<td></td>
</tr>
<tr>
<td></td>
<td>6. Earthing and bonding systems</td>
<td></td>
</tr>
<tr>
<td>10. Lift and Conveyor Installations or Systems</td>
<td>1. Lifts and enclosed hoists</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2. Escalators</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3. Moving pavements</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4. Powered stairlifts</td>
<td></td>
</tr>
<tr>
<td></td>
<td>5. Conveyors</td>
<td></td>
</tr>
<tr>
<td></td>
<td>6. Dock levellers and scissor lifts</td>
<td></td>
</tr>
<tr>
<td></td>
<td>7. Cranes and unenclosed hoists</td>
<td></td>
</tr>
<tr>
<td></td>
<td>8. Car lifts, car stacking systems, turntables and the like</td>
<td></td>
</tr>
<tr>
<td></td>
<td>9. Document handling systems</td>
<td></td>
</tr>
<tr>
<td></td>
<td>10. Other transport systems</td>
<td></td>
</tr>
<tr>
<td>11. Fire and Lightning Protection</td>
<td>1. Fire fighting systems</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2. Fire suppression systems</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3. Lightning protection</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2. Security systems</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3. Central control or building management systems</td>
<td></td>
</tr>
<tr>
<td>13. Special Installations or Systems</td>
<td>1. Specialist piped supply installations</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2. Specialist refrigeration systems</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3. Other specialist mechanical installations or systems</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4. Specialist electrical or electronic installations systems</td>
<td></td>
</tr>
<tr>
<td></td>
<td>5. Water features</td>
<td></td>
</tr>
<tr>
<td>14. Builder’s Work in Connection with Services</td>
<td>1. General builder’s work</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>2. Ancillary drainage systems</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3. External chemical, toxic and industrial liquid waste drainage</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4. Land drainage</td>
</tr>
<tr>
<td>7. External Services</td>
<td>1. Water mains supply</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2. Electricity mains supply</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3. External transformation devices</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4. Electricity distribution to external plant and equipment</td>
<td></td>
</tr>
<tr>
<td></td>
<td>5. Gas mains supply</td>
<td></td>
</tr>
<tr>
<td></td>
<td>6. Telecommunications and other communication system connections</td>
<td></td>
</tr>
<tr>
<td></td>
<td>7. External fuel storage and piped distribution systems</td>
<td></td>
</tr>
<tr>
<td></td>
<td>8. External security systems</td>
<td></td>
</tr>
<tr>
<td></td>
<td>9. Site or street lighting systems</td>
<td></td>
</tr>
<tr>
<td></td>
<td>10. Local or district heating installations</td>
<td></td>
</tr>
<tr>
<td></td>
<td>11. Builder’s work in connection with external services</td>
<td></td>
</tr>
</tbody>
</table>
Additional information

None.
Mat 02 Environmental impacts from construction products

Fully fitted | Simple building | Shell & core | Shell only
---|---|---|---

Aim

To encourage availability of robust and comparable data on the impacts of construction materials through the provision of EPD.

Value

- Improve the accuracy of building life cycle assessment (LCA)
- Improve the availability of robust and comparable data for designers and specifiers to aid materials selection and specification
- Increase the consistency in the information requested from manufacturers
- Increase the uptake of EPD by material and product manufacturers
- Increase the accuracy and comparability of building level LCA so helping to reduce the overall life cycle impacts arising from the building

Context

A variety of construction product environmental claims are offered by manufactures, other industry sources and in guidance, but the results presented are often inconsistent and therefore not suitable for making comparisons. In addition, even comparable information is difficult for a non-specialist to understand. Such information will often be biased towards presenting the benefits of a material and avoid or reduce the emphasis on negative impacts. This
risks designers, clients and constructors being misled by the information provided, leading to incorrect decisions being taken that could result in increased environmental impacts. As a result, available information can often be misleading to designers and specifiers.

Specifiers can make better informed decisions using comparable EPD and generic LCA data in a recognised building LCA tool (see Mat 01 Environmental impacts from construction products - Building life cycle assessment on page 287), that presents results at the building level and over the life cycle of the building.

Increasing numbers of EPD are being produced by construction product manufacturers. However, many construction products do not have an EPD, meaning generic LCA data must be used when carrying out a building LCA. While helpful in making basic materials choices at the early design stage, this does not assist in specifying less impacting products and materials during detailed design and construction stages. Further accuracy can be gained when carrying out LCA or specifying materials and components by using EPD specific to a manufacturer’s product range or, better still, the specific construction product.

### Assessment scope

<table>
<thead>
<tr>
<th>Fully fitted</th>
<th>Simple building</th>
<th>Shell and core</th>
<th>Shell only</th>
</tr>
</thead>
<tbody>
<tr>
<td>All</td>
<td>All</td>
<td>All</td>
<td>All</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Assessment type specific notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Assessment type specific</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Building type specific</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
</tr>
</tbody>
</table>
Mat 02 Environmental impacts from construction products

Assessment criteria

One credit - Specification of products with a recognised environmental product declaration (EPD)
1 Specify construction products with EPD that achieve a total EPD points score of at least 20.
2 Enter the details of each EPD into the Mat 01 Results Submission Tool, including the material category classification. The Mat 01 Results Submission Tool will verify the EPD points score and credit award.

Compliance notes
Compliance notes are located in Appendix G – Notes for compliance on page 18 for the consultation. These compliance notes will be available through the knowledge base when the scheme goes live.

Methodology

Total EPD points score methodology
The total EPD points score shall be calculated as follows:
1. For each EPD that is applicable to a specified construction product, use Table 52 below to find the EPD points score.
2. For each EPD, use Table 53 on the facing page to find the applicable material classification (according to the construction product). If a product comprises more than one material, the material category classification representing the majority of the product (by volume) should be selected.
3. Add together the applicable EPD points for each material classification (an EPD can be counted in only one classification group).
4. If a material classification has a calculated score higher than 4 EPD points, reduce the score to 4.
5. Add together the EPD points calculated for each material classification to obtain the total EPD points score.

Table 52 EPD points for different types of EPD
<table>
<thead>
<tr>
<th>Recognised types of EPD</th>
<th>Validity</th>
<th>EPD points</th>
</tr>
</thead>
<tbody>
<tr>
<td>EPD applicable to more than one product in the same product category, and a more than one manufacturer</td>
<td>EPD unexpired at the point of specification.</td>
<td>0.5</td>
</tr>
</tbody>
</table>
Table 53 Material classification

<table>
<thead>
<tr>
<th>Material category</th>
<th>Uniclass equivalent code (for information)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Timber or timber-based</td>
<td>P5</td>
</tr>
<tr>
<td>Concrete or cementitious</td>
<td>P2*</td>
</tr>
<tr>
<td>Metal</td>
<td>P4</td>
</tr>
<tr>
<td>Stone or aggregate</td>
<td>P1, P3*</td>
</tr>
<tr>
<td>Clay-based</td>
<td>P33</td>
</tr>
<tr>
<td>Gypsum</td>
<td>P232</td>
</tr>
<tr>
<td>Glass</td>
<td>P314</td>
</tr>
<tr>
<td>Plastic, polymer, resin, paint, chemicals and bituminous</td>
<td>P7, P34</td>
</tr>
<tr>
<td>Animal fibre or skin, cellulose fibre</td>
<td>P6</td>
</tr>
<tr>
<td>Other</td>
<td></td>
</tr>
</tbody>
</table>

*Except subsets listed separately. For example, P2 generally relates to ‘2. Concrete or cementitious’ except for the subset P232 which relates to ‘6. Gypsum’

Evidence

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Interim design stage</th>
<th>Final post-construction stage</th>
</tr>
</thead>
<tbody>
<tr>
<td>All</td>
<td>One or more of the appropriate evidence types listed in The BREEAM evidential requirements on page 38 can be used to demonstrate compliance with these criteria.</td>
<td>As per interim design stage</td>
</tr>
<tr>
<td>All</td>
<td>The Mat 01 results Submission tool</td>
<td>As per interim design stage</td>
</tr>
<tr>
<td>All</td>
<td>Copies of EPD certificates</td>
<td>As per interim design stage</td>
</tr>
</tbody>
</table>

Definitions

Environmental Product Declaration (EPD)

An EPD compliant with BREEAM is an independently verified environmental label (i.e. ISO Type III label) according to the requirements of ISO14025

Mat 01 Results Submission Tool

The Mat 01 Results Submission Tool provides a standardised way for BRE Global to collect information for this issue. In addition, it can be used by those who do not have access to the building LCA tool to compare what is
modelled with other sources of design information (bills of quantities, drawings, specifications etc.), and see the breakdown of environmental impacts. In addition, the data in the tool may be used by BRE Global for updating the BREEAM benchmarks and for other research activities (in a way that is not attributable to individual buildings).

Additional information

None.
Mat 03 Responsible sourcing of materials

**Aim**

To facilitate the selection of products that involve lower levels of negative environmental, economic and social impact across their supply chain including extraction, processing and manufacture.

**Value**

- Promote more economically, socially and environmentally responsible practices across the construction materials, component manufacturing and supply sectors.
- Encourages the construction industry to identify risks and reduce the environmental, economic and social issues in the supply chain of construction products.
- Encourages the use and the improvement of credible and comparable schemes to evaluate the responsible sourcing of materials.

**Context**

Most construction materials involve long and complex supply chains that result in a wide range of impacts globally. These might include environmental (e.g. toxicity or biodiversity), economic (e.g. corruption) or social (e.g. slave labour, equality) issues and can occur during the extraction, processing, manufacturing or supply chain stages. The construction sector in the UK has considerable growth opportunities, not only nationally, but also internationally. The global construction market is forecast to grow by over 70% by 2025. Increased global competition does risk less responsible practices being employed. Credible certification schemes exist to give confidence to specifiers that
risks are being minimised or avoided and their use ensures that specifiers are able to demonstrate the responsible nature of their selection decisions.

### Assessment scope

<table>
<thead>
<tr>
<th></th>
<th>Fully fitted</th>
<th>Simple building</th>
<th>Shell and core</th>
<th>Shell only</th>
</tr>
</thead>
<tbody>
<tr>
<td>Applicable Assessment criteria</td>
<td>All</td>
<td>All</td>
<td>All</td>
<td>All</td>
</tr>
<tr>
<td>Assessment type specific notes</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>None</td>
</tr>
</tbody>
</table>

**Assessment type specific**

- None

**Building type specific**

- None
Mat 03 Responsible sourcing of materials

Assessment criteria

Prerequisite
1  All timber and timber-based products used on the project are legally harvested and traded timber as per the UK government’s Timber Procurement Policy (TPP)\(^{(179)}\). See Definitions on page 316.

Compliance with criterion 1 is a minimum requirement for achieving any BREEAM rating.

There are no prerequisite requirements for other materials.

One credit - Sustainable procurement plan
2  Source materials in accordance with a documented Sustainable procurement plan. The plan must:
   2.a: Be in place before RIBA stage 2 Concept Design
   2.b: Include sustainability aims, objectives and targets to guide procurement activities
   2.c: Include an assessment of the potential to procure materials locally. There must be a policy to procure materials locally where possible.
   2.d: Include details of procedures in place to check and verify the effective implementation of the sustainable procurement plan

In addition, if the plan is applied to several sites or adopted at an organisational level it must:
   2.e: Identify the risks and opportunities of procurement against a broad range of social, environmental and economic issues following the process set out in BSISO20400:2017\(^{(180)}\).

Up to 3 credits - Responsible sourcing of materials (RSM)
3  Use the Mat 03 calculator tool and methodology to determine the number of credits achieved for the materials specified or procured. Credits are awarded in proportion to the number of RSM points achieved, as set out in Table 54 below.

<table>
<thead>
<tr>
<th>Credits achieved</th>
<th>% of available RSM points achieved</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>≥ 10%</td>
</tr>
<tr>
<td>2</td>
<td>≥ 20%</td>
</tr>
<tr>
<td>3</td>
<td>≥ 30%</td>
</tr>
<tr>
<td>1 exemplary performance credit</td>
<td>≥ 50%</td>
</tr>
</tbody>
</table>

Compliance notes
Compliance notes are located in Appendix G – Notes for compliance on page 18 for the consultation. These compliance notes will be available through the knowledge base when the scheme goes live.
Methodology

Assessment process

To determine the number of credits that are achieved for the Responsible Sourcing of Construction Products (criterion 3), the Mat 03 calculator tool must be completed with all the relevant information. Each construction product is entered in the tool individually unless they are below the relevant threshold. Where the quantity of a product has not been calculated, use Route 1 on page 315 for that product. Where the quantity of a product is known, use Route 2 on page 315. This may be the case that across an assessment there will be a combination of routes for 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 materials category. The following steps outline the process to be followed to determine the number of credits achieved for responsible sourcing, followed by illustrative examples.

For examples and a further explanation of this method, along with a simplified methodology for building services construction products, see Guidance Note 24.

Step 1: Collating information and entering it in the BREEAM UK Mat 03 tool

For all routes, the BREEAM UK Mat 03 tool is used according to the following steps.

1. For each construction product in the building that is in the scope (see Table 56 on page 314 under 'Scope of assessment' section below):

   - Note: For route 1, only steps 1.1, 1.3, 1.5, 1.6, 1.7 and 1.9 must be followed. Step 1.4 is optional for routes 1 and 2.

   - Step 1.1: Estimate if the quantity of the product is above the cut-off volume (see Route 1 Cut-off on page 315). If it is, enter the construction product in the tool and assign it a 'Location and use' category, then proceed to the next step. If the quantity meets the cut-off then the product can be excluded.

   - Step 1.2 Route 2: Estimate the quantity (mass or volume) of the product. See Quantities precision on page 315.

   - Step 1.3: Obtain the BREEAM recognised responsible sourcing certifications scheme (RSCS) certification or environmental management system (EMS) certification, if any (see Definitions on page 316). Compare the certification with Guidance Note 18 and obtain the RSCS point score. Where the construction product has no certification, is non-compliant with broken chain requirements (see Broken chain on page 314) or the certification type is not listed in Guidance Note 18, the score is zero. Where the construction product is a reused product, obtain the score from Guidance Note 18 for these products.

   - Step 1.4 (Optional, if not being followed go to step 1.5): Where a constituent construction product has a better certification score than the overall construction product and it complies with the broken chain requirements, the following steps should be followed:

     - Step 1.4.1: Identify the materials categories that make up an estimated ≥ 80% of the constituent construction product’s volume.

     - Step 1.4.2: Include each identified materials category in the tool (by creating new rows in the tool).

     - Step 1.4.3: If ≥ 5% of the volume is unaccounted for in step 1.4.1, include the ‘Other’ material category.

     - Step 1.4.4 Route 2: For each material following route 2 and identified in step 1.4.1, enter the building-wide quantity into the tool. This may be based on a percentage of the overall construction product’s quantity estimated in step 1.1.
Step 1.4.5. For each material category (including ‘Other’), enter the constituent’s certification score identified in step 1.4 into the tool.

Step 1.5. Identify the materials categories that make up an estimated 80% of the product’s volume (excluding quantities entered for step 1.4.1, if applicable).

Step 1.6. Include each identified materials category in the tool (by duplicating the entry made in step 1.1).

Step 1.7. If ≥ 5% of the volume is unaccounted for in step 1.5 (and step 1.4, where applicable), include the ‘Other’ material category.

Step 1.8. Route 2: For each material category following route 2 and identified in step 1.5, enter the building-wide quantity into the tool. This may be based on a percentage of the overall construction product’s quantity estimated in step 1.1.

Step 1.9. For each material category (including ‘Other’), enter the overall construction product’s certification score (from step 1.3) into the tool.

Step 2: BREEAM UK Scoring and Reporting tool

Step 2.1. Enter the credit result produced by the BREEAM UK Mat 03 tool into the BREEAM UKs Scoring and Reporting tool.

Scope of Assessment

*Table 55* below (based on the New Rules of Measurement (NRM) classification system) indicates the building elements that must be included in the scope of the assessment. Including these elements (and only these) is necessary to ensure an appropriate level of comparability. All construction products that are installed as part of one or more of these building elements are in scope and must be included in the BREEAM UK Mat 03 tool. For each building element the respective location or use category for use in the BREEAM UK Mat 03 tool is provided in the table.

*Table 55* Scope assessment, common building element designation and location and use categories

<table>
<thead>
<tr>
<th>RICS NRM elements and BREEAM equivalents</th>
<th>Level 1 element: 1—Substructure</th>
<th>Level 2 element: 1—Substructure</th>
<th>Level 3 sub-element</th>
<th>BREEAM ‘Location and use’ category</th>
<th>To be included</th>
</tr>
</thead>
<tbody>
<tr>
<td>Level 1 element: 1—Substructure</td>
<td></td>
<td></td>
<td>Standard foundations</td>
<td>7. Structure, primary and secondary</td>
<td>Y</td>
</tr>
<tr>
<td>Level 2 element: 1—Substructure</td>
<td></td>
<td></td>
<td>Specialist foundations systems</td>
<td>7. Structure, primary and secondary</td>
<td>Y</td>
</tr>
<tr>
<td>Level 3 sub-element</td>
<td></td>
<td></td>
<td>Lowest floor construction</td>
<td>7. Structure, primary and secondary</td>
<td>Y</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Basement excavation</td>
<td>N/A</td>
<td>Y</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Basement retaining walls</td>
<td>7. Structure, primary and secondary</td>
<td>Y</td>
</tr>
<tr>
<td>Level 1 element: 2—Superstructure</td>
<td></td>
<td></td>
<td>Steel frames</td>
<td>7. Structure, primary and secondary</td>
<td>Y</td>
</tr>
<tr>
<td>Level 2 element: 1—Frame</td>
<td></td>
<td></td>
<td>Space decks</td>
<td>7. Structure, primary and secondary</td>
<td>Y</td>
</tr>
<tr>
<td>Level 3 sub-element</td>
<td></td>
<td></td>
<td>Concrete casings to steel frames</td>
<td>7. Structure, primary and secondary</td>
<td>Y</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Concrete frames</td>
<td>7. Structure, primary and secondary</td>
<td>Y</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Timber frames</td>
<td>7. Structure, primary and secondary</td>
<td>Y</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Other frame systems</td>
<td>7. Structure, primary and secondary</td>
<td>Y</td>
</tr>
</tbody>
</table>

<p>| Level 1 element: 2—Superstructure       | Level 2 element: 2—Upper Floors | Sub-element | BREEAM Location | BREEAM ‘Location and use’ category | To be included |
| Level 2 element: 2—Upper Floors         |                                 | Sub-element | BREEAM Location | BREEAM ‘Location and use’ category | To be included |</p>
<table>
<thead>
<tr>
<th>RICS NRM elements and BREEAM equivalents</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Floors</td>
<td>3. Floor (including floor finishes)</td>
</tr>
<tr>
<td>2</td>
<td>Balconies</td>
<td>3. Floor (including floor finishes)</td>
</tr>
<tr>
<td>3</td>
<td>Drainage to balconies</td>
<td>11. Other</td>
</tr>
</tbody>
</table>

**Level 1 element: 2—Superstructure**  
**Level 2 element: 3—Roof**

<table>
<thead>
<tr>
<th>Sub-element</th>
<th>BREEAM Location</th>
<th>BREEAM ‘Location and use’ category</th>
<th>To be included</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Roof structure</td>
<td>6. Roof (including roof finishes)</td>
<td>Y</td>
</tr>
<tr>
<td>2</td>
<td>Roof coverings</td>
<td>6. Roof (including roof finishes)</td>
<td>Y</td>
</tr>
<tr>
<td>3</td>
<td>Specialist roof systems</td>
<td>6. Roof (including roof finishes)</td>
<td>Y</td>
</tr>
<tr>
<td>4</td>
<td>Roof drainage</td>
<td>6. Roof (including roof finishes)</td>
<td>Y</td>
</tr>
<tr>
<td>5</td>
<td>Roof lights, skylights and openings</td>
<td>2. Door and window</td>
<td>Y</td>
</tr>
<tr>
<td>6</td>
<td>Roof features</td>
<td>6. Roof (including roof finishes)</td>
<td>Y</td>
</tr>
</tbody>
</table>

**Level 1 element: 2—Superstructure**  
**Level 2 element: 4—Stairs and ramps**

<table>
<thead>
<tr>
<th>Sub-element</th>
<th>BREEAM Location</th>
<th>BREEAM ‘Location and use’ category</th>
<th>To be included</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Stairs and ramps structures</td>
<td>7. Structure, primary and secondary</td>
<td>Y</td>
</tr>
<tr>
<td>2</td>
<td>Stair and ramp finishes</td>
<td>3. Floor (including floor finishes)</td>
<td>Y</td>
</tr>
<tr>
<td>3</td>
<td>Stair and ramp balustrades and handrails</td>
<td>11. Other</td>
<td>Y</td>
</tr>
<tr>
<td>4</td>
<td>Ladders, chutes and slides</td>
<td>11. Other</td>
<td>Y</td>
</tr>
</tbody>
</table>

**Level 1 element: 2—Superstructure**  
**Level 2 element: 5—External walls**

<table>
<thead>
<tr>
<th>Sub-element</th>
<th>BREEAM Location</th>
<th>BREEAM ‘Location and use’ category</th>
<th>To be included</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>External enclosing walls above ground floor level</td>
<td>8. External wall</td>
<td>Y</td>
</tr>
<tr>
<td>2</td>
<td>External enclosing wall below ground floor level</td>
<td>7. Structure, primary and secondary</td>
<td>Y</td>
</tr>
<tr>
<td>3</td>
<td>Solar and Rain screening</td>
<td>8. External wall</td>
<td>Y</td>
</tr>
<tr>
<td>4</td>
<td>External soffits</td>
<td>8. External wall</td>
<td>Y</td>
</tr>
<tr>
<td>5</td>
<td>Subsidiary walls, balustrades, handrail and proprietary balconies</td>
<td>11. Other</td>
<td>Y</td>
</tr>
<tr>
<td>6</td>
<td>Façade access and cleaning systems</td>
<td>11. Other</td>
<td>Y</td>
</tr>
</tbody>
</table>

**Level 1 element: 2—Superstructure**  
**Level 2 element: 6—Windows and external doors**

<table>
<thead>
<tr>
<th>Sub-element</th>
<th>BREEAM Location</th>
<th>BREEAM ‘Location and use’ category</th>
<th>To be included</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>External windows</td>
<td>2. Door and window</td>
<td>Y</td>
</tr>
<tr>
<td>2</td>
<td>External doors</td>
<td>2. Door and window</td>
<td>Y</td>
</tr>
</tbody>
</table>

**Level 1 element: 2—Superstructure**  
**Level 2 element: 7—Internal walls and partitions**

<table>
<thead>
<tr>
<th>Sub-element</th>
<th>BREEAM Location</th>
<th>BREEAM ‘Location and use’ category</th>
<th>To be included</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Walls and partitions</td>
<td>5. Internal partition and internal walls (including finishes)</td>
<td>Y</td>
</tr>
<tr>
<td>2</td>
<td>Balustrades and handrails</td>
<td>11. Other</td>
<td>Y</td>
</tr>
<tr>
<td>3</td>
<td>Moveable room dividers</td>
<td>5. Internal partition and internal walls (including finishes)</td>
<td>Y</td>
</tr>
<tr>
<td>4</td>
<td>Cubicles</td>
<td>5. Internal partition and internal walls (including finishes)</td>
<td>Y</td>
</tr>
<tr>
<td>RICS NRM elements and BREEAM equivalents</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>------------------------------------------</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Level 1 element: 2–Superstructure</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Level 2 element: 8–Internal doors</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Sub-element</strong></td>
<td>BREEAM Location</td>
<td>BREEAM 'Location and use' category</td>
<td>To be included</td>
</tr>
<tr>
<td>1 Internal doors</td>
<td>2. Door and window</td>
<td>Y</td>
<td></td>
</tr>
</tbody>
</table>

| **Level 1 element: 3–Internal Finishes** |
| **Level 2 element: 1–Wall finishes**   |
| **Sub-element** | BREEAM Location | BREEAM 'Location and use' category | To be included |
| 1 Finishes to walls | 5. Internal partition and internal walls (including finishes) | Y |

| **Level 1 element: 3–Internal Finishes** |
| **Level 2 element: 3–Ceiling finishes** |
| **Sub-element** | BREEAM Location | BREEAM 'Location and use' category | To be included |
| 1 Finishes to ceilings | 1. Ceiling (including ceiling finishes) | Y |
| 2 False ceilings | 1. Ceiling (including ceiling finishes) | Y |
| 3 Demountable suspended ceilings | 1. Ceiling (including ceiling finishes) | Y |

| **Level 1 element: 4–Fittings, Furnishings and Equipment** |
| **Level 2 element: 1–Fitting, furnishings and equipment** |
| **Sub-element** | BREEAM Location | BREEAM 'Location and use' category | To be included |
| 2 Kitchen fittings and equipment (ONLY) | 11. Other | Y |

| **Level 1 element: 5–Services** |
| **Level 2 element: (ALL)** |
| **Sub-element** | BREEAM Location | BREEAM 'Location and use' category | To be included |
| (ALL) | 9. Building services | Y |

| **Level 1 element: 8–External Works** |
| **Level 2 element: 2–Roads, paths and pavings** |
| **Sub-element** | BREEAM Location | BREEAM 'Location and use' category | To be included |
| 1 (ALL) | 10. Hard landscaping | Y |

| **Level 1 element: 8–External Works** |
| **Level 2 element: 2–Roads, paths and pavings** |
| **Sub-element** | BREEAM Location | BREEAM 'Location and use' category | To be included |
| 1 (ALL) | 10. Hard landscaping | Y |

| **Level 1 element: 8–External Works** |
| **Level 2 element: 3–Soft landscaping, planting and irrigation systems** |
| **Sub-element** | BREEAM Location | BREEAM 'Location and use' category | To be included |
| N/A | N |

| **Level 1 element: 8–External Works** |
| **Level 2 element: 4–Fencing, railings and walls** |
| **Sub-element** | BREEAM Location | BREEAM 'Location and use' category | To be included |
| 1 (ALL) | 10. Hard landscaping | Y |

| **Level 1 element: 8–External Works** |
| **Level 2 element: 5–External fixtures** |
| **Sub-element** | BREEAM Location | BREEAM 'Location and use' category | To be included |
The material categories, for use in the BREEAM UK Mat 03 tool, must be in accordance with Material categories below. For each construction product, identify the closest matching category.

**Table 56 Material categories**

<table>
<thead>
<tr>
<th>Material categories</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Timber or timber-based products</td>
</tr>
<tr>
<td>2. Concrete or cementitious</td>
</tr>
<tr>
<td>3. Metal</td>
</tr>
<tr>
<td>4. Stone or aggregate</td>
</tr>
<tr>
<td>5. Clay-based</td>
</tr>
<tr>
<td>6. Gypsum</td>
</tr>
<tr>
<td>7. Glass</td>
</tr>
<tr>
<td>8. Plastic, polymer, resin, paint, chemicals and bituminous</td>
</tr>
<tr>
<td>9. Animal fibre, skin, cellulose fibre</td>
</tr>
<tr>
<td>10. Other.</td>
</tr>
</tbody>
</table>

**BREEAM recognised responsible sourcing certification schemes and their point scores**

Typically certificates are used to confirm compliance of materials 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 of the organisations who administer RSM certification schemes will, via their website, list companies and products that have been certified against their standards, including the scope of any such certification.

Some schemes will provide downloadable copies of the relevant certificate which can in turn be used as evidence of compliance for this BREEAM issue.

**Approach to building services**

A simplified approach for building services products and materials has been set out in Guidance Note 18: Demonstrate Compliance with BREEAM Issue Mat 03. Building services products and materials are included in Mat 03 assessments to stimulate the market for responsible sourcing certification products in this sector. It is acknowledged that their inclusion is challenging due to the high number and complexity of these products.

**Broken chain**

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 BREEAM UK Mat 03 tool where the downstream risk to responsible sourcing is considered to be low. Specifically, it is acceptable for the following types of organisations in the supply chain (that are downstream of the organisation with certification) not to have their own responsible sourcing certification:

1. Organisations that only handle or transport, OR
2. Organisations that only fabricate, assemble or install and are using a recognised quality management system to ensure the mixing and substitution of the certified upstream source with uncertified sources has
not occurred AND are operating in a jurisdiction that can demonstrate relatively robust and well enforced environmental, social and economic controls. For example, states which are members of the EU1—states that have declared adherence to the OECD Guidelines for Multinational Enterprises.

Route 1 Cut-off

See Step 1: Collating information and entering it in the BREEAM UK Mat 03 tool on page 310. Any construction product in the following location or use categories which clearly accounts for less than the following volumes can be excluded from the assessment. 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 this threshold. See also Quantities precision. - ‘Internal partition and internal walls (including finishes)’: Less than 0.33 m³ per 1000m² of gross internal floor area (GIFA). - ‘Ceiling (including ceiling finishes)’: Less than 0.33 m³ per 1000m² of GIFA. - All other location or use categories: Less than 1m³ per 1000 m² of GIFA.

Quantities precision

The degree of tolerance accepted for estimating quantities is ± 20% of the final installed quantity. It is not necessary for the assessor to submit calculations in order to justify estimates. In particular, the cut-off estimation for many construction products (that are clearly below the cut-off) may be done without the need for any calculations at all.

Route 1

Route 1 does not require the quantities of each construction product to be entered into the BREEAM International Mat 03 tool. This reduces the time taken to calculate the score achieved per construction product but, because the varying quantities of each construction product in the building cannot be taken into account when the credit is calculated, the lowest ‘location or use’ category score per materials category is used for the overall materials category score.

Route 2

Route 2 provides a more accurate measurement of the risks in the building design associated with construction products by taking account of the quantity of each construction product with a location and use category. It requires quantities to be entered into BREEAM International Mat 03 tool rather than using the lowest ‘location or use’ category score per material category. The improvement in rigour justifies route 2 having the potential to produce better scores than route 1.

Evidence

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Interim design stage</th>
<th>Final post-construction stage</th>
</tr>
</thead>
<tbody>
<tr>
<td>All</td>
<td>See The BREEAM evidential requirements on page 38 section for a list of general evidence types that can be used to demonstrate compliance with the relevant criteria for this issue.</td>
<td>As per interim design stage.</td>
</tr>
<tr>
<td>All</td>
<td>Evidence of level of responsible sourcing achieved for each material and product. For example, certificates.</td>
<td>As per interim design stage.</td>
</tr>
<tr>
<td>All</td>
<td>Completed copy of the Mat 03 Calculator tool</td>
<td>As per interim design stage.</td>
</tr>
<tr>
<td>All</td>
<td>Evidence to show how the Mat 03 calculator tool has been completed.</td>
<td>As per interim design stage.</td>
</tr>
</tbody>
</table>
Definitions

BREEAM Mat 03 calculator
A Calculator tool used by the BREEAM Assessor to determine the number of BREEAM credits achieved for BREEAM issue Mat 03.

BREEAM recognised responsible sourcing certification schemes (RSCSs)
These are third party schemes evaluated by BRE Global for recognition under BREEAM. Refer to Guidance Note 18 available in the Responsible sourcing section of the BREEAM website for information on the evaluation criteria and the process for the evaluation and acceptance of schemes, including application and appeals.

Legally harvested and traded timber
BREEAM follows the UK government’s definition of legally sourced timber, as outlined in the Central Point of Timber (CPET) 5th Edition on 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. Independently verifiable legal and sustainable sources (FSC or PEFC)
2. Forest Law Enforcement, Governance and Trade (FLEGT)—licensed timber or equivalent sources
3. Evidence on a case-by-case basis in line with the Framework for Evaluating Category B evidence

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 the CPET website www.gov.uk/guidance/.

New rules of measurement (NRM)
NRM provides a standard set of measurement rules and essential guidance for the cost management of construction projects and maintenance works. For more information visit www.rics.org.

Responsible sourcing
The management and implementation of sustainable development principles in the provision, procurement and traceability of construction materials and components. In BREEAM, this is demonstrated through auditable third party certification schemes. Refer to Guidance Note 18 available in the Resources section of the BREEAM website for an up-to-date table of responsible sourcing certification schemes recognised by BRE Global Ltd for the purposes of a BREEAM assessment.

Responsible sourcing certification scheme point scores
A graded scale to reflect the rigour of the certification scheme used to demonstrate responsible sourcing, forming the basis for awarding credits in the BREEAM issue Mat 03. Refer to Guidance Note 18 available in the Resources section of the BREEAM website for an up-to-date table of responsible sourcing certification schemes recognised by BRE Global Ltd for the purposes of a BREEAM assessment.

Sustainable procurement plan
A plan that sets out a clear framework for the responsible sourcing of materials to guide procurement throughout a project and by all involved in the specification and procurement of construction materials. The plan may be prepared and adopted at an organisational level or be site or project specific.
Additional information

None.
Mat 04 Insulation

This is no longer assessed as a separate issue within BREEAM UK New Construction 2018.
Mat 05 Designing for durability and resilience

Aim

To reduce the need to repair and replace materials resulting from damage to exposed elements of the building and landscape.

Value

- Avoid unnecessary cost and material use resulting from the need to repair and replace damaged elements as a result of operational wear and tear.

- Minimise costs and disruption resulting from environmental degradation to building elements as a result of avoidable weathering and changes to climatic conditions over time.

Context

Exposed elements of a building or landscaping are at risk of damage through impact or wear and tear. This can result in significant and unnecessary materials use and waste generation across the life of a building. This can be minimised by risk areas being identified and designed out, and suitable protection measures being provided. The inclusion of this issue within BREEAM highlights the need to consider future repairs and replacements, as well as their associated costs, when designing and specifying materials for a new building.
In addition climate change can significantly accelerate the deterioration of materials used in a building. It is therefore important to consider the impact of climate change and its associated environmental changes on the vulnerable elements within the built environment. Impacts of climate change can be mitigated by good design and specification so that stakeholders can have increased confidence in the durability of new buildings and their individual elements.

### Assessment scope

<table>
<thead>
<tr>
<th></th>
<th>Fully fitted</th>
<th>Simple building</th>
<th>Shell and core</th>
<th>Shell only</th>
</tr>
</thead>
<tbody>
<tr>
<td>Applicable Assessment criteria</td>
<td>All</td>
<td>All</td>
<td>All</td>
<td>All</td>
</tr>
<tr>
<td>Assessment type specific notes</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>None</td>
</tr>
</tbody>
</table>

- **Assessment type specific**: None
- **Building type specific**: None
Mat 05 Designing for durability and resilience

Assessment criteria

One credit

Protecting vulnerable parts of the building from damage
1 Protection measures are incorporated into the building’s design and construction to reduce damage to the building’s fabric or materials in case of accidental or malicious damage occurring. These measures must provide protection against:

1.a: Negative impacts of 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 by a vehicle. Protection where parking or manoeuvring areas are within 1 metre of the building façade and where delivery areas or routes are within 2 metres of the façade, i.e. specifying bollards or protection rails.

1.d: Potential malicious damage to building materials and finishes, in public and common areas where appropriate.

Protecting exposed parts of the building from material degradation
2 Key exposed building elements have been designed and specified to limit long and short term degradation due to environmental factors. This can be demonstrated through one of the following:

2.a: The element or product achieving an appropriate quality or durability standard or design guide (or if none available, BS 7543:2015 as the default appropriate standard)

2.b: A detailed assessment of the element’s resilience when exposed to the applicable material degradation and environmental factors set out in Table 57 on page 324.

3 If BS 7543:2015 is used, the design team can deviate from it to meet criterion 2.a. The assessor should use their professional judgment in determining whether the deviations are acceptable, ensuring that the choices demonstrated that they have designed and specified materials or measures which will be effective in preventing unnecessary deterioration, so reducing frequent replacements, repairs and maintenance through the life cycle of the building.

4 Include convenient access to the roof and façade for cost effective cleaning, replacement and repair in the building’s design.

5 Design the roof and façade to prevent water damage, ingress, and detrimental ponding.

See Table 57 on page 324 for an example list of relevant industry durability and quality standards.

Compliance notes
Compliance notes are located in Appendix G – Notes for compliance on page 18 for the consultation. These compliance notes will be available through the knowledge base when the scheme goes live.
Methodology

Examples of suitable durability measures

Suitable durability and protection measures to vulnerable parts of the building can include:

1. Bollards, barriers or raised kerbs to delivery and vehicle drop-off areas
2. Robust external wall construction, up to 2m high
3. Corridor walls specified to Severe Duty (SD) as per BS 5234-2 and, for Healthcare buildings, Health
   Technical Memorandum 56 - Partitions.\(^{(182)}\)(\(^{(183)}\))
4. Protection rails to walls of corridors
5. Kick plates or impact protection (from trolleys etc.) on doors
6. Hard-wearing and easily washable floor finishes in heavily used circulation areas (i.e. main entrance,
   corridors, public areas etc.)
7. Door stoppers to prevent door handles damaging walls
8. Designing out the risk without the need for additional materials specification to protect vulnerable areas.

Designed to prevent water damage

A common and potentially significantly damaging failure mechanism for external envelopes is water ingress or
other type of water damage. The design team should demonstrate that they have carefully considered the
drainage mechanisms of the façade and roof on a small and large scale to prevent staining, detrimental oxidation,
ponding, rot, ingress or any other deleterious effect. This should take the form of a risk assessment, the complexity
and detail of which is related to the complexity and innovative nature of the façade and roof. The final design
should demonstrate that, where possible, these negative impacts have been avoided.

None.

Evidence

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Interim design stage</th>
<th>Final post-construction stage</th>
</tr>
</thead>
<tbody>
<tr>
<td>All</td>
<td>One or more of the appropriate evidence types listed in The BREEAM evidential requirements on page 38 can be used to demonstrate compliance with these criteria.</td>
<td></td>
</tr>
</tbody>
</table>

Definitions

Appropriate industry quality or durability standard

An established industry quality standard, certification or mark with testing procedures which demonstrate the
quality and durability of the product or element. Examples of relevant standards for various element types are
provided in Table 57 on page 324. The use of relevant standards outside of the examples provided is also a
compliant route providing the standard is relevant for the element. It is the responsibility of the assessor to
confirm that the standard used is appropriate for the element or product it is applied to and increases its durability.

**Convenient access**
Access to the roof and façade is safe and convenient for routine maintenance, cleaning and repair. A façade access strategy designed in line with CIRIA guide C686 would be considered compliant. If access to the majority of the façade requires contracting on a one-off basis an external firm with specialist equipment, or specialist access professionals it would not generally be considered to be convenient.

**Durability**
Ability of a building and its parts to perform its required function over a period of time and under the influence of degrading agents, without undue maintenance, repair, replacement or refurbishment.

**Key exposed building element**
Key exposed building elements in the context of this issue are those adding up to at least 80% by area of each of the following categories:

1. External walls and cladding
2. Roof or balconies
3. Glazing: windows, skylights
4. Hard landscaping

**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 and construction that result in lower materials usage and lower wastage levels including off-site manufacture and use of pre-assembled service pods.

**New rules of measurement (NRM)**
NRM provides a standard set of measurement rules and essential guidance for the cost management of construction projects and maintenance works. For more information visit: [www.rics.org](http://www.rics.org).

**Relevant industry durability design guide**
An established industry design guide with the objective of improving the durability of the element. Examples of relevant standards or guides for various element types are provided in Table 57 on the next page. The use of relevant guides outside of the examples provided is also a compliant route providing the guide is relevant for the element. It is the responsibility of the assessor to confirm that the guide used is appropriate for the element or product it is applied to and increases its durability.

**Additional information**

**BS 7543:2015: Guide to durability of buildings and building elements, products and components**
This standard gives a useful overview of the field of durability and provides a process for predicting a materials service life. It provides useful guidance on the methodology for assessing and measuring durability and identifies
common durability failures for typical construction materials. In addition, it lists some example predicted service lives for typical materials.

**Table 57 Examples of relevant industry durability or quality standards and design guides**

<table>
<thead>
<tr>
<th>Examples of relevant industry durability or quality standards and design guides</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Timber</strong></td>
</tr>
<tr>
<td>Class 1 or 2 against BSEN 350-1:1994</td>
</tr>
<tr>
<td>TRADA: W1S 4-28 Durability by design</td>
</tr>
<tr>
<td>TRADA: Specifying timber exposed to weathering</td>
</tr>
<tr>
<td>TRADA: Timber external Doors</td>
</tr>
<tr>
<td>(BRE Good practice guidance?)</td>
</tr>
<tr>
<td>BS8605 2014 External Timber Cladding Part 1 - Method of Specifying</td>
</tr>
<tr>
<td><strong>Curtain walling</strong></td>
</tr>
<tr>
<td>Centre for Window and Cladding Technology (CWCT) Curtain Wall Standards</td>
</tr>
<tr>
<td>BS EN ISO 9001, BS EN ISO 14001 and OHSAS 18001 Standards. Weather tested to</td>
</tr>
<tr>
<td>CWCT Sequence B and EN13830:2003</td>
</tr>
<tr>
<td>BS EN 13830 Specification for Curtain Walling</td>
</tr>
<tr>
<td>CWCT: Curtain Wall Installation Handbook</td>
</tr>
<tr>
<td><strong>Brickwork, blockwork</strong></td>
</tr>
<tr>
<td>BDA Design note 7: Brickwork Durability</td>
</tr>
<tr>
<td>BDA: Severely Exposed Brickwork</td>
</tr>
<tr>
<td><strong>Roof elements</strong></td>
</tr>
<tr>
<td>BRE: Roofs and roofing. Performance, diagnosis, maintenance, repair and the</td>
</tr>
<tr>
<td>avoidance of defects. 3rd edition (2009)</td>
</tr>
<tr>
<td>NFRC: Profiled Sheet Roofing and Cladding - The guide to Design and Best P</td>
</tr>
<tr>
<td>practice (2016)</td>
</tr>
<tr>
<td>CIBSE: Guidelines for the design and application of green roof systems (2</td>
</tr>
<tr>
<td>013)</td>
</tr>
<tr>
<td>Flexible Membrane Roofing: A Professional’s Guide to Specifications</td>
</tr>
<tr>
<td><strong>Metal cladding</strong></td>
</tr>
<tr>
<td>NFRC: Profiled Sheet Roofing and Cladding - The guide to Design and Best P</td>
</tr>
<tr>
<td>(2016)</td>
</tr>
<tr>
<td>MCRMA: Metal Fabrications: Design, Detailing and Installation Guide</td>
</tr>
<tr>
<td><strong>Glazing</strong></td>
</tr>
<tr>
<td>BS EN 12488:2016: Glass in building - glazing recommendations - assembly p</td>
</tr>
<tr>
<td>inciples for vertical and sloping glazing</td>
</tr>
<tr>
<td><strong>Masonry</strong></td>
</tr>
<tr>
<td>PD 6697:2010 – Recommendations for the design of masonry structures</td>
</tr>
<tr>
<td>BS EN 1996-2:2006 Design of Masonry Structures – Durability Section</td>
</tr>
<tr>
<td><strong>Other useful standards or design guides</strong></td>
</tr>
<tr>
<td>BRE: Cracking in Buildings (2016)</td>
</tr>
<tr>
<td>BS 7543:2015: Guide to durability of buildings and building elements, prod</td>
</tr>
<tr>
<td>ucts and components</td>
</tr>
</tbody>
</table>

If you would like an additional standard or design guide to be recognised, please submit your proposal as a technical query to breeam@bre.co.uk.
Mat 06 Material efficiency

Fully-fitted Simple building Shell & core Shell only

Minimum standards

Aim

To avoid unnecessary materials use arising from over specification without compromising structural stability, durability or the service life of the building.

Value

- Reductions in cost as a result of a reduction of material use in building design.
- Encourages the reuse of existing materials.
- Encourages the use of materials with higher levels of recycled content.
- Improve understanding of and the performance of alternative design and construction methods that result in lower material usage and waste levels.

Context

The construction industry accounts for approximately 55% of the total annual material use and buildings contribute 50% of total emissions of CO$_2$eq. They are also responsible for 30% of total UK water use and 35% of arising waste. The breakdown of global industrial carbon emissions shows that 55% comes from the
manufacturing and processing of five stock materials: steel (25%), cement (19%), paper (4%), plastic and aluminium (3%).

Building standards and institutional requirements are often based on standardised, tried and tested design solutions which can result in significant over specification of elements and hence material use. Some of this is to allow for future flexibility in use that will never in reality be used and more is the result of conservative evaluation of risk.

Therefore, optimising material use in the context of a specific project is one of the key resource efficiency goals for any sustainability strategy. This can be achieved through careful consideration of current and future project demands to maximise the efficient use of materials, waste prevention and reduction, minimal damage to the environment and reduced depletion of natural resources.

### Assessment scope

<table>
<thead>
<tr>
<th></th>
<th>Fully fitted</th>
<th>Simple building</th>
<th>Shell and core</th>
<th>Shell only</th>
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<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>None</td>
</tr>
</tbody>
</table>
Mat 06 Material efficiency

Assessment criteria

One credit
1. Identify opportunities to optimise the use of materials during the design, procurement, and construction of the project, also considering material maintenance and end of life.
2. Implement appropriate and effective opportunities in the building’s design and specification.
3. The design and construction team consult with relevant participants at each of the following RIBA stages:
   3.a: Preparation and Brief
   3.b: Concept Design
   3.c: Developed Design
   3.d: Technical Design
   3.e: Construction.

Compliance notes
Compliance notes are located in Appendix G – Notes for compliance on page 18 for the consultation. These compliance notes will be available through the knowledge base when the scheme goes live.

Methodology

None.

Evidence

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Interim design stage</th>
<th>Final post-construction stage</th>
</tr>
</thead>
<tbody>
<tr>
<td>All</td>
<td>One or more of the appropriate evidence types listed in The BREEAM evidential requirements on page 38 can be used to demonstrate compliance with these criteria.</td>
<td></td>
</tr>
</tbody>
</table>
## Definitions

### Appropriate and effective opportunities
Material efficiency measures which do not compromise the aesthetics, structural stability, durability or service life of the building. The measures should also be implementable in practice and cost-effective.

### Material efficiency
The process of designing a building to achieve its stated performance standards while reducing its embodied impact by reducing the quantity of materials required to do so. 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 and construction that result in lower materials usage and lower wastage levels including off-site manufacturer or use of pre-assembled service pods.

## Additional information

### Table 58 Examples of material efficiencies at each work stage

<table>
<thead>
<tr>
<th>Work stages and efficiencies</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Preparation and Brief</strong></td>
</tr>
<tr>
<td><strong>Objective</strong></td>
</tr>
<tr>
<td><strong>Participants</strong></td>
</tr>
<tr>
<td><strong>Action</strong></td>
</tr>
<tr>
<td><strong>Evidence</strong></td>
</tr>
</tbody>
</table>

### Concept Design

<table>
<thead>
<tr>
<th><strong>Objective</strong></th>
<th>Develop strategies to implement or action the materials efficiency requirements set under the Preparation and Brief stage.</th>
</tr>
</thead>
</table>
| **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

<table>
<thead>
<tr>
<th><strong>Objective</strong></th>
<th>Develop design proposals based on learning from the concept design.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Participants</strong></td>
<td>All relevant members of the design team</td>
</tr>
</tbody>
</table>
### Work stages and efficiencies

<table>
<thead>
<tr>
<th><strong>Action</strong></th>
<th>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.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Evidence</strong></td>
<td>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.</td>
</tr>
<tr>
<td><strong>Construction</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Objective</strong></td>
<td>Implement material efficiency measures in construction.</td>
</tr>
<tr>
<td><strong>Participants</strong></td>
<td>Principal contractor</td>
</tr>
<tr>
<td><strong>Action</strong></td>
<td>Implement material efficiency measures and strategies identified in previous stages in building construction and identify deviations. Identify further efficiencies as appropriate for this stage.</td>
</tr>
<tr>
<td><strong>Evidence</strong></td>
<td>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.</td>
</tr>
</tbody>
</table>

This table is based on the principles set out in parts 1 and 2 of the BSS8895 series of standards, and provides examples of how material efficiency can be considered in each work stage. As a minimum, the measures listed under the ‘evidence’ column must be met to show compliance with the issue.

### Optimising material use

The construction industry accounts for approximately 55% of the total annual materials consumption and buildings contribute 50% of total emissions of CO₂e. They are also responsible for 30% of total UK water use and 35% of arising waste. The breakdown of global industrial carbon emissions shows that 55% comes from the manufacture and processing of five stock materials: steel (25%), cement (19%), paper (4%), plastic and aluminium (3%).

Optimising material use is one the key resource efficiency goals for any sustainability strategy. This involves various components to ensure efficient use of materials, waste prevention and reduction, minimal damage to the environment and depletion of natural resources. This new BREEAM issue aims to encourage and support efforts to reduce the amount of materials use in building design without compromising on the structural stability. BRE intends to further develop the assessment criteria for this issue in future updates of BREEAM and as such BRE would welcome any feedback on the application of this assessment issue to assist with the evolution of the criteria and inclusion of additional guidance on compliance in future BREEAM versions.

### Tools to guide material efficiency strategies

The following provide frameworks for the consideration and review of resource efficiency in design and construction:

### 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 de-construction and material re-use
7. Designing with low embodied carbon materials
8. Using pre-fabricated elements where appropriate to reduce material waste
9. Consider using an ‘exposed thermal mass’ design strategy to reduce finishes
10. Avoiding over-specification of predicted loads
11. Using lightweight structural design strategies
12. Making use of bespoke structural elements
13. Reducing the ‘rationalisation’ of structural elements
14. Optimising the foundation design for embodied environmental impact

BS 8895 Designing for material efficiency in building projects

The standard 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 is comprised of the following four parts:
  - Part 1: Code of practice for Strategic Definition and Preparation and Brief (published)
  - Part 2: Code of practice for concept and developed design (published)
  - Part 3: Code of practice for technical design (planned for development)
  - Part 4: Code of practice for operation, refurbishment (planned for development)

WRAP

Designing out Waste: A design team guide for Buildings\(^{(186)}\). This document outlines five principles of designing out waste and can be applied during design development, and prompts opportunities to investigate for material efficiency in design. Some key questions to consider are:

1. Can the design, form and layout be simplified without compromising the design concept?
2. Can the design be coordinated to avoid or minimise excess cutting and jointing of materials that generate waste?
3. Is the building designed to standard material dimensions?
4. Can the range of materials required be standardised to encourage reuse of offcuts?
5. Is there repetition and coordination of the design, to reduce the number of variables and allow for operational refinement (e.g. reusing formwork)?
Waste

Summary
This section encourages the reduction of waste from construction and throughout the lifetime of the building. It rewards sustainable waste management, as well as waste reporting, reduction and diversion from landfill during construction, but also encourages sustainable practices during the building operation. Finally, this section encourages waste minimisation through optimised design methods, which consider current, but also future needs, responding to functional requirements and climate change adaptation. 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.

Wst 01 Construction waste management
Improving resource efficiency through developing a pre-demolition audit and a Resource Management Plan, maximising the recovery of material during demolition and diverting non-hazardous waste from landfill.

Wst 02 Use of recycled and sustainably sourced aggregates
Encouraging the use of recycled or secondary aggregate or aggregate types with lower environmental impact to reduce waste and optimise material efficiency.

Wst 03 Operational waste
Encouraging the diversion of operational waste from landfill through the provision of space and facilities allowing the segregation and storage of recyclable waste.

Wst 04 Speculative floor and ceiling finishes
Specification of floor and ceiling finishes only where agreed with the occupant or, for tenanted areas where the future occupant is unknown, installation in a show area only, to reduce wastage.

Wst 05 Adaptation to climate change
Encourage consideration and implementation of measures to mitigate the impact of more extreme weather conditions arising from climate change over the lifespan of the building.

Wst 06 Design for disassembly and adaptability
Encourage consideration and implementation of measures design options related to adaptability and disassembly, which can accommodate future changes to the use of the building and its systems over its lifespan.
Wst 01 Construction waste management

Aim

To reduce construction waste by encouraging reuse, recovery and best practice waste management practices to minimise waste going to landfill.

Value

- Minimise cost and environmental damage resulting from waste going to landfill
- Maximise the recovery and reuse of construction materials to avoid unnecessary extraction and processing of virgin materials
- Reduces construction costs resulting from wastage on site

Context

One third of all waste in the UK, 120 million tonnes of waste per year, is generated by the construction and demolition sector, which is the largest contributor of waste in the nation.
Best practice solutions include; off-site construction, where construction waste can be halved, the adoption of waste management methods such as the waste hierarchy and the implementation of the circular economy concept, which provides an alternative to a traditional linear economy (make, use, dispose). This approach is adopted by certain manufacturers that offer a ‘take back’ scheme and by design teams that use the concept of ‘design for de-construction’ (187).

Reducing waste simultaneously reduces the environmental impact as well as the cost of the construction process. The true cost of waste encompasses the cost of the product or material that is wasted, the cost of handling waste and the cost of waste management. While there may be revenue associated with the recycling of certain material streams, typically construction sites have to pay for collection or processing of the waste. Legislation in this area has changed over time, however the benefit to the developer of avoiding unnecessary materials use and waste and the environment remain the same.

### Assessment scope

<table>
<thead>
<tr>
<th></th>
<th>Fully fitted</th>
<th>Simple building</th>
<th>Shell and core</th>
<th>Shell only</th>
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<tbody>
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</table>
**Wst 01 Construction waste management**

**Assessment criteria**

This issue is split into three parts:

- Pre-demolition audit (1 credit)
- Construction resource efficiency (3 credits)
- Diversion of resources from landfill (1 credit).

**One credit - Pre-demolition audit**

1. To determine if refurbishment or reuse is feasible, complete a pre-demolition audit of any existing buildings, structures or hard surfaces to be demolished. If infeasible, use the pre-demolition audit to maximise the recovery of material for subsequent high grade or value applications. The audit must cover the content of **Pre-demolition audit scope** and:

   1.a. Follow the pre-demolition or pre-refurbishment Code of Practice.

   OR

   1.b: Be carried out at Concept Design stage (RIBA Stage 2) by a competent person (see Definitions); prior to strip-out or demolition works;

   1.c: Guide the design, consider materials for reuse and set targets for waste management;

   1.d: Engage all contractors in the process of maximising high grade reuse and recycling opportunities.

   1.e: Compare actual waste arisings and waste management routes used with those forecast and investigate significant deviations from planned targets.


**Up to three credits - Construction resource efficiency**

3. Prepare a compliant Resource Management Plan (RMP) covering:

   3.a: Non-hazardous waste materials (from on-site construction and dedicated off-site manufacture or fabrication, see Additional information), including demolition and excavation waste.

   3.b: Accurate data records on waste arisings and waste management routes (see KB).

4. Meet or improve upon the benchmarks in Table 59 for non-hazardous construction waste, excluding demolition and excavation waste.

**Table 59 Construction waste resource efficiency benchmarks**

<table>
<thead>
<tr>
<th>BREEAM credits</th>
<th>Amount of waste generated per 100m² (gross internal floor area)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>m³ (actual, not bulk volume)</td>
</tr>
<tr>
<td>One credit</td>
<td>≤ 13.3</td>
</tr>
<tr>
<td>Two credits</td>
<td>≤ 7.5</td>
</tr>
<tr>
<td>Three credits</td>
<td>≤ 3.4</td>
</tr>
<tr>
<td>Exemplary level</td>
<td>≤ 1.6</td>
</tr>
</tbody>
</table>
One credit - Diversion of resources from landfill

5 Meet, where applicable, the diversion from landfill benchmarks in Table 60 for non-hazardous construction waste and demolition and excavation waste generated.

6 Sort waste materials into separate key waste groups as per Table 61, either on-site or through a licensed contractor for recovery.

Table 60 Diversion from landfill benchmarks

<table>
<thead>
<tr>
<th>BREEAM credits</th>
<th>Type of waste</th>
<th>Volume</th>
<th>Tonnage</th>
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<tbody>
<tr>
<td>One credit</td>
<td>Non-demolition</td>
<td>70%</td>
<td>80%</td>
</tr>
<tr>
<td></td>
<td>Demolition</td>
<td>80%</td>
<td>90%</td>
</tr>
<tr>
<td></td>
<td>Excavation</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Exemplary level</td>
<td>Non-demolition</td>
<td>85%</td>
<td>90%</td>
</tr>
<tr>
<td></td>
<td>Demolition</td>
<td>85%</td>
<td>95%</td>
</tr>
<tr>
<td></td>
<td>Excavation</td>
<td>95%</td>
<td>95%</td>
</tr>
</tbody>
</table>

Exemplary level criteria

To achieve an exemplary performance credit:

7 Non-hazardous construction waste generated, excluding demolition and excavation waste, is less than or equal to the exemplary level resource efficiency benchmarks (see Table 59).

8 The percentage of non-hazardous construction, demolition and excavation waste (if relevant) diverted from landfill meets or exceeds the exemplary level percentage benchmarks in Table 60.

9 All key waste groups in Table 61 for diversion from landfill are covered in the RMP.

10 Waste data obtained from licensed external waste contractors is reliable and verifiable, by using data from EA/SEPA/EA Wales/NIEA Waste Return Forms or from a PAS 402:2013 certified company (see Definitions on page 337).

One credit - Simple buildings - Pre-demolition audit

11 Meet compliance with criteria 1 and 2.

One credit - Simple buildings - Construction resource efficiency

12 Produce a Resource Management Plan (RMP) with the aim of minimising and monitoring waste.

Two credits - Simple buildings - RMP measurements and reporting

13 Meet compliance with criterion 12.

14 Waste management procedures recorded in the RMP and implemented measure and report:

14.a Construction waste generated by the project in m³ or tonnes per 100 m² gross internal floor area; exclude demolition and excavation waste.

14.b The proportion of construction waste diverted from landfill, i.e. reused, recycled or recovered

One credit - Simple buildings - Diversion from landfill

15 Meet compliance with criteria 5 and 6.

Exemplary level criteria - Simple buildings

To achieve an exemplary performance credit

16 Achieve the first three construction resource efficiency credits.
17 Record the source of the waste arisings of the non-hazardous construction waste measured or monitored by associating the waste with project work packages (see Methodology below).

18 Meet or improve on the BREEAM exemplary level benchmark (Table 60) for the diversion from landfill of generated non-hazardous construction and demolition waste.

Compliance notes

Compliance notes

Compliance notes are located in Appendix G – Notes for compliance on page 18 for the consultation. These compliance notes will be available through the knowledge base when the scheme goes live.

Methodology

Resource Management Plan records

The project materials waste arisings and waste management routes should be recorded for construction, demolition and excavation waste.

The performance benchmarks for the award of credits are based on non-hazardous materials and exclude hazardous waste, demolition waste, excavation waste, canteen, office and municipal waste.

Pre-demolition audit scope

The pre-demolition audit must cover:

1. Identification and quantification of the key materials where present on the project (see Table 61);
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 reprocessors 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.

Work packages

For the simple building exemplary criteria, the waste arisings need to be associated with the source of waste by project work packages. These work packages could include:

1. Asbestos removal
2. External and site works
3. Fixtures and fittings
4. Groundworks and excavation
5. Refurbishment
6. Remediation
7. Re-roofing
8. Services
9. Soft strip
10. Substructure
11. Superstructure.

Evidence

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Interim design stage</th>
<th>Final post-construction stage</th>
</tr>
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<tbody>
<tr>
<td>All</td>
<td>One or more of the appropriate evidence types listed in <em>The BREEAM evidential requirements on page 38</em> can be used to demonstrate compliance with these criteria.</td>
<td>As per interim design stage</td>
</tr>
</tbody>
</table>

Definitions

Pre-demolition audit competent person
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.

Resource Management Plan (RMP)
A 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 and off the site. A compliant RMP defines:

1. A target benchmark for resource efficiency, i.e. m³ of waste per 100 m² or tonnes of waste per 100 m²
2. Procedures and commitments to minimise non-hazardous waste in line with the target benchmark
3. Procedures to minimise hazardous waste; these are:
   a. 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, e.g. using data from EA/SEPA/EA Wales/NIEA waste return forms or from PAS402 certified company
   b. 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
   c. Procedures to sort, reuse and recycle construction waste into defined waste groups, either on site or through a licensed external contractor
   d. Procedures to review and update the plan
   e. The name or job title of the individual responsible for implementing the above.
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, e.g. using data from EA/SEPA/EA Wales/NIEA waste return forms or from PAS402 certified company.

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.

**Best practice construction waste management plan (see RMP and SWMP)**

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:
   - Defra (Department of Environment, Food and Rural Affairs)
   - BRE (Building Research Establishment Ltd)
   - Welsh Government
   - SEPA.

**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**

Actions to avoid waste being disposed of in landfill include:

- Reusing the material on site (in situ or for new applications)
- Reusing the material on other sites
- Community reuse and recycling
- Salvaging or reclaiming the material for reuse
- Returning material to the supplier via a ‘take-back’ scheme
- Direct recycling of materials via a specialist material reprocessor or recycler
- Recovery of the material from site by an approved waste management contractor and recycled or sent for energy recovery
- Utilising waste in exempt or permitted applications (not landfill).

**PAS 402:2013**

PAS 402:2013 is a specification for performance reporting that can be adopted by waste management organisations. It is applicable to waste management organisations that process waste, e.g. a waste treatment facility and not those operating solely as carriers or brokers. The specification provides the framework for the demonstration of performance against key areas of delivery, including how waste management activities are conducted, landfill diversion and materials recovery, assuring potential and existing customers of the service they are procuring. It can provide clients such as government and local authorities with a framework for good practice which they can specify.

**Site Waste Management Plans**

Some locations may have a legal requirement, due to government requirements, to produce a Site Waste Management Plan (SWMP) containing prescribed details. An SWMP is a form of resource management plan. To
achieve any of the construction waste management credits the assessed development, regardless of value or locality, must have a BREEAM compliant Resource Management Plan that should be written in line with best practice.

**Waste hierarchy**

The order of priority for the management of waste where waste generation could or does occur. This is listed in descending order of environmental preference in The Waste (England and Wales) Regulation 2011(188) as:

- Prevention: using material in design and manufacture, keeping products for longer, re-use, using less hazardous materials
- Preparing for re-use: checking, cleaning, repairing, refurbishment, whole items or spare parts
- Recycling: turning waste into a new substance or produce. It includes composting if it meets quality protocols
- Other recovery: includes anaerobic digestions, incineration with energy recovery, gasification and pyrolysis, which produce energy (fuels, heat and power) and materials from waste
- Disposal landfill and incineration without energy recovery.

**Waste minimisation**

This term encompasses two elements of the waste hierarchy: waste reduction or prevention = using less material in design, manufacture and installation, keeping products for longer, using no hazardous materials; Reuse = using products again for the same purpose for which they were conceived, which may require checking, cleaning or repairing (preparing for reuse). Types of waste minimisation actions include:

1. Set and report against waste reduction targets
2. Design for standardisation of components
3. Avoid waste from excavation or groundworks and consider opportunities for zero cut and fill
4. Return packaging for reuse
5. Consider community reuse of surplus or offcuts
6. Include waste minimisation initiatives and targets in tenders or contracts and engage with the supply chain
7. Consider use of BIM (Building Information Modelling)
8. Design for off-site or modular build
9. Design for flexibility, adaptability and future deconstruction
10. Design to use fewer materials
11. Use of reusable temporary elements such as shuttering and protection.

This list is not exhaustive and other waste minimisation actions can be taken.

**Waste management routes**

Description of how waste will be managed according to the waste hierarchy, e.g. reused, recycled, recovered and disposed.

**Additional information**

**Construction waste groups**

<table>
<thead>
<tr>
<th>Table 61 Construction waste groups</th>
</tr>
</thead>
<tbody>
<tr>
<td>European Waste Catalogue</td>
</tr>
<tr>
<td>170102</td>
</tr>
</tbody>
</table>
### European Waste Catalogue

<table>
<thead>
<tr>
<th>Code</th>
<th>Key group</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>170101</td>
<td>Concrete</td>
<td>Pipes, kerb stones, paving slabs, concrete rubble, precast and in situ</td>
</tr>
<tr>
<td>170604</td>
<td>Insulation</td>
<td>Glass fibre, mineral wool, foamed plastic</td>
</tr>
<tr>
<td>1501</td>
<td>Packaging</td>
<td>Paint pots, pallets, cardboard, cable drums, wrapping bands, polythene sheets</td>
</tr>
<tr>
<td>170201</td>
<td>Timber</td>
<td>Softwood, hardwood, board products such as plywood, chipboard, medium density fibreboard (MDF)</td>
</tr>
<tr>
<td>1602</td>
<td>Electrical and electronic equipment</td>
<td>Electrical and electronic TVs, fridges, air-conditioning units, lamps equipment</td>
</tr>
<tr>
<td>1301</td>
<td>Oils</td>
<td>Hydraulic oil, engine oil, lubricating oil</td>
</tr>
<tr>
<td>1703</td>
<td>Asphalt and tar</td>
<td>Bitumen, coal tars, asphalt</td>
</tr>
<tr>
<td>170103</td>
<td>Tiles and ceramics</td>
<td>Ceramic tiles, clay roof tiles, ceramic, sanitary ware</td>
</tr>
<tr>
<td>1701</td>
<td>Inert</td>
<td>Mixed rubble or excavation material, glass</td>
</tr>
<tr>
<td>1704</td>
<td>Metals</td>
<td>Radiators, cables, wires, bars, sheet</td>
</tr>
<tr>
<td>170802</td>
<td>Gypsum</td>
<td>Plasterboard, plaster, fibre cement sheets</td>
</tr>
<tr>
<td>170101</td>
<td>Binders</td>
<td>Render, cement, mortar</td>
</tr>
<tr>
<td>170203</td>
<td>Plastics</td>
<td>Pipes, cladding, frames, non-packaging sheet</td>
</tr>
<tr>
<td>1705</td>
<td>Soils</td>
<td>Soils, clays, sand, gravel, natural stone</td>
</tr>
<tr>
<td>Most relevant EWC</td>
<td>Liquids</td>
<td>Non-hazardous paints, thinners, timber treatments</td>
</tr>
<tr>
<td>Most relevant EWC</td>
<td>Hazardous</td>
<td>Defined in the Hazardous Waste List (HWL) of the European Waste Catalogue (EWC)</td>
</tr>
<tr>
<td>Most relevant EWC</td>
<td>Floor coverings (soft)</td>
<td>Carpets, vinyl flooring</td>
</tr>
<tr>
<td>Most relevant EWC</td>
<td>Architectural features</td>
<td>Roof tiles, reclaimed bricks, fireplaces</td>
</tr>
<tr>
<td>170904 (Mixed)</td>
<td>Mixed or other</td>
<td>Efforts should be made to categorise waste into the above categories wherever possible.</td>
</tr>
</tbody>
</table>

### BREEAM construction resource efficiency benchmarks

The resource efficiency benchmarks used in BREEAM have been derived using data collected from hundreds of real life projects using BRE’s SMARTWaste system, from July 2008 to July 2016. The BREEAM credits are aligned to the benchmarks as follows:

1. One credit: Performance in the top 50% of projects (better than standard practice)
2. Two credits: Performance in the top 25% of projects (good practice)
3. Three credits: Performance in the top 10% of projects (best practice)
4. Exemplary level: Performance in the top 5% of projects (exemplary practice).

For more information please see [www.smartwaste.co.uk](http://www.smartwaste.co.uk)

### Why does BREEAM exclude demolition and excavation waste from the resource efficiency benchmarks?

BREEAM does not include demolition and excavation (D&E) waste in its resource efficiency benchmark, despite it often being the largest tonnage of waste on-site, because the amount of D&E waste produced is site-dependent. Furthermore, it is not necessarily possible to reduce the amount of demolition waste (unless a decision is taken not to demolish in the first place).

Including D&E waste in an overall construction resource efficiency benchmark would:
1. Not encourage sites with unavoidably large amounts of D&E waste to focus on reducing waste arising from construction materials (which would have further knock-on environmental impacts); and
2. Mean that sites with little or no D&E waste would find compliance with the benchmark more straightforward, which would weaken the drivers for reducing construction waste resulting from the specification and use of new building materials.

BREEAM aims to ensure that, where D&E waste is generated, it is diverted from landfill and where possible reused for high grade use on site to reduce the volume of new materials produced or required in the supply chain (which themselves may go on to generate additional waste). One credit and an exemplary level credit are available where it can be demonstrated that D&E waste has been diverted from landfill.

**Tools for preparing, implementing and reviewing a RMP**

SMARTWaste® is a web-based membership tool allowing users to measure and monitor construction site impacts.

The tool can be used for:

- Preparing, implementing and reviewing SWMPs or RMPs
- Online measuring and reporting on
  - Waste (aligned to defined waste groups)
  - Site energy, fuel and water use
  - CO₂ production from energy usage
  - Procurement of certified or sustainable timber
  - Transport impacts from materials deliveries, waste removal and staff travel to and from the site
  - Pre-demolition versus post-demolition waste data
- Industry waste benchmarks

This membership tool is frequently updated and offers the user flexibility, reporting and support. Templates are available to meet the latest BREEAM credits and can also be downloaded. More information is available at

www.smartwaste.co.uk

Other tools for preparing, implementing and reviewing a RMP may be available.
Wst 02 Use of recycled and sustainably sourced aggregates

**Aim**

To encourage the use of more sustainably sourced aggregates, encourage reuse where appropriate and avoid waste and pollution arising from disposal of demolition and other forms of waste.

**Value**

- Encourages the specification of more sustainable aggregate sourcing options
- Considers a broad range of factors influencing aggregates’ selection, i.e. regional aggregate availability, environmental and social impacts of transport and the overall carbon footprint

**Context**

The use of secondary and recycled aggregate in higher value situations should be rewarded as a means to discourage their devaluation as a material resource or their disposal to landfill.
Thanks to the Aggregates Levy and the Landfill Tax, recent evidence indicates that the amount of aggregates being disposed of in landfill and being used as low grade fill has decreased markedly in recent years. However sourcing of aggregates remains an issue in terms of the range of environmental and social impacts that arise from the extraction and transport of aggregates in the UK.

Therefore, primary aggregates can still be considered a sustainable option, where locally sourced, sustainably transported and from a region where that aggregate type is abundant. In addition, the use of secondary aggregates resulting from other processes such as marine dredging can also be considered sustainable under certain circumstances.

Assessment scope

<table>
<thead>
<tr>
<th></th>
<th>Fully fitted</th>
<th>Simple building</th>
<th>Shell and core</th>
<th>Shell only</th>
</tr>
</thead>
<tbody>
<tr>
<td>Applicable assessment criteria</td>
<td>All</td>
<td>All</td>
<td>All</td>
<td>All</td>
</tr>
<tr>
<td>Assessment type specific notes</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>None</td>
</tr>
</tbody>
</table>

Assessment type specific

None

Building type specific

None

None
Wst 02 Use of recycled and sustainably sourced aggregates

Assessment criteria

Prerequisite
To encourage the reuse of site-won material on site, when demolition occurs, complete a pre-demolition audit of any existing buildings, structures or hard surfaces to be demolished in accordance with Wst 01 Construction waste management: Criterion on page 332.

One credit - Project Sustainable Aggregate points
1 Identify all aggregates uses and type on the project Table 63 and Table 64 on page 346
2 Determine the quantity in tonnes for each identified use and aggregate type
3 Identify the region in which the aggregate source is located
4 Identify the distance in kilometres travelled by all aggregates by transport type
5 Enter the information into the BREEAM Wst 02 calculator to calculate the Project Sustainable Aggregate points. The corresponding number of BREEAM credits will be awarded as shown in Table 62

Table 62 Credits available relating to the Project Sustainable Aggregate points

<table>
<thead>
<tr>
<th>Project Sustainable Aggregate Credits</th>
<th>Project Sustainable Aggregate points</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>3.56</td>
</tr>
<tr>
<td>1 exemplary performance credit</td>
<td>&gt;6</td>
</tr>
</tbody>
</table>

Exemplary level criteria
To achieve an exemplary performance credit:

6 The Project Sustainable Aggregate points score meets or exceeds the exemplary level performance benchmark in Table 62.
Methodology

Information on the quantity, source and use of each type of aggregate used must be obtained and entered into the BREEAM Wst 02 calculator. This generates the Project Sustainable Aggregate point score, which determines the number of credits awarded.

The information required to calculate the Project Sustainable Aggregate point score is specified below:

1. Identify all aggregates used on the project (Table 63) and the aggregate type (Table 64);

Table 63 Aggregate uses

<table>
<thead>
<tr>
<th>Aggregate type</th>
<th>Reference</th>
<th>Conversions</th>
<th>Potential applications on project</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engineered fill</td>
<td>Aggregates compliant with Class 6 or Class 9 under the Specification for Highways Works (SHW) Series 600 Earthworks</td>
<td>Assume 1m³ of engineered fill is approximately 2.0 tonnes</td>
<td>Backfill to basement walls Sub-base and base courses for hard landscape and local roads</td>
</tr>
<tr>
<td>Concrete coarse aggregate</td>
<td>4-20mm aggregate produced in accordance with EN12620: Aggregates for concrete Or EN1 3055 Lightweight aggregates Part 1</td>
<td>Assume 1m³ of concrete requires 1.0 tonne of coarse aggregate (or 0.5 tonnes in the case of lightweight aggregate)</td>
<td>Foundations, frame, floors as ready-mix concrete or precast concrete</td>
</tr>
<tr>
<td>Concrete fine aggregate</td>
<td>0-4mm aggregate produced in accordance with EN12620: Aggregates for concrete</td>
<td>Assume 1m³ of concrete requires 0.7 tonne of fine aggregate</td>
<td>Foundations, frame, floors as ready-mix concrete or precast concrete</td>
</tr>
<tr>
<td>Asphalt aggregate</td>
<td>Aggregates produced in accordance with EN1 3043: Aggregates for bituminous mixtures and surface treatments for roads, airfields and other trafficked areas</td>
<td>Assume 1m³ of asphalt requires approximately 2.1 tonnes of aggregate</td>
<td>Access roads and external circulation areas</td>
</tr>
<tr>
<td>Granular bedding for pipes</td>
<td>Aggregates produced in accordance with EN1 3242: Aggregates for unbound and hydraulically bound materials for use in civil</td>
<td>Assume 1m³ of pipe bedding is approximately 2.0 tonnes</td>
<td>Bedding for surface water drainage and sewage pipes installed in</td>
</tr>
</tbody>
</table>
Table 64 Aggregate types

<table>
<thead>
<tr>
<th>Aggregate types</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hard rock (including limestone and granite)</td>
</tr>
<tr>
<td>Land-based sand or gravel</td>
</tr>
<tr>
<td>Marine-dredged sand or gravel</td>
</tr>
<tr>
<td>Recycled</td>
</tr>
<tr>
<td>Secondary</td>
</tr>
</tbody>
</table>

1. Determine the quantity in tonnes for each identified use and aggregate type. Include all aggregates that represent at least 5% of the overall aggregate demand for the project. The conversions in Table 63 can be applied at Design Stage where exact details of concrete mix designs and aggregate specifications are not yet known. Exact values must be reported at Post Construction;

2. Identify the region in which the aggregate source is located, according to the categories in Table 65;

3. Identify the distance in kilometres travelled by all aggregates by transport type from ‘aggregate gate’ to site;

4. Based on the above data inserted for all aggregates, the Wst 02 calculator will determine:
   a. Mineral resource depletion (kgSbeq)
   b. Social cost of transport (pence/tonne)
   c. Carbon footprint (kgCO₂e/tonne)
   d. The correspondent Sustainable Aggregates Points per tonne
   e. The number of credits achieved, as per Table 62

5. Enter the credit score into the BREEAM scoring and reporting tool.

Off-site recycled aggregates

Where off-site recycled aggregates from construction, demolition and excavation waste are used, they shall be produced according to the relevant Quality Protocol (189) or comply with the relevant BS/EN standards for aggregates (190) in order to contribute to the Project Sustainable Aggregate point score.
Aggregates in off-site manufactured applications

Where any of the listed applications have been manufactured off-site, any aggregate present shall be included in the assessment of this issue.

Transport distance calculation

Where distribution is undertaken by road from the quarry or wharf, determine the likely road kilometres undertaken on strategic motorways, other motorways, main roads and secondary roads. For rail or water distribution, estimates can be made based on the equivalent distance that would be made by road. For asphalt and concrete, onward distribution from the batching facility must also be included.

Table 65 Region of source (quarry or marine dredge site)

<table>
<thead>
<tr>
<th>Aggregate types</th>
<th>North East</th>
<th>Yorkshire and Humber</th>
<th>North West</th>
<th>East Midlands</th>
<th>West Midlands</th>
<th>East of England</th>
<th>London</th>
<th>South East</th>
<th>South West</th>
<th>North Wales</th>
<th>South Wales</th>
</tr>
</thead>
</table>

Evidence

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Interim design stage</th>
<th>Final post-construction stage</th>
</tr>
</thead>
<tbody>
<tr>
<td>All</td>
<td>One or more of the appropriate evidence types listed in The BREEAM evidential requirements on page 38 can be used to demonstrate compliance with these criteria.</td>
<td>As per interim design stage.</td>
</tr>
<tr>
<td>All</td>
<td>A completed copy of the Wst 02 calculator.</td>
<td>As per interim design stage.</td>
</tr>
<tr>
<td>All</td>
<td>Documentary evidence supporting the data used to complete the Calculator tool.</td>
<td>As per interim design stage.</td>
</tr>
</tbody>
</table>

Definitions

Air-cooled blast furnace slag (see secondary aggregates definition)

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 BS Aggregates Standards that apply to the end use application (e.g. bitumen bound, unbound etc.)

**Aggregate gate source**
Consider the 'gate' as following:
- Marine dredged aggregates: the wharf at which the aggregate is first landed;
- Land-based resources: the quarry or recycling facility.

**Main roads and secondary roads**
Main roads refer to A-roads and secondary roads should include all B-roads and other local roads.

**Quality Protocol**
The purpose of a Quality Protocol is to provide a uniform control process for producers, from which they can reasonably state and demonstrate that their product has been fully recovered and is no longer a waste. It also provides purchasers with a product quality managed to common standards, which increases confidence in performance. Aggregates that do not meet the requirements of a Quality Protocol or relevant aggregate standards will still be considered waste. Protocols exist for:
- Aggregates produced from inert waste
- Use of pulverised fuel ash (PFA) and furnace bottom ash (FBA) in bound applications.

**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 and recycled glass bottles.

**Secondary aggregates**
By-products of industrial processes that can be processed to produce secondary aggregates. Secondary aggregates are subdivided into manufactured and natural, depending on their source. Recognised non-construction post-consumer or post-industrial byproducts include:

1. China clay waste (also known as Cornish granite, or stent)
2. By-products of dredging for navigational purposes
3. Slate overburden
4. Lightweight aggregate manufactured from PFA
5. Ground granulated blast furnace slag (GGBFS)
6. Air-cooled blast furnace slag
7. Steel slag
8. Quarry overburden, or other material not subject to the Aggregates Levy
9. FBA
10. Incinerator bottom ash
11. Foundry sands
12. Recycled glass
13. Recycled plastic
14. Spent oil shale
15. Colliery spoil
16. Municipal solid waste treatment residues.

PFA and GGBFS, used as a cement replacement, should not be included in these calculations.

**Strategic motorways**
In the UK these are:
M60, M25, M3 in Hampshire (junctions 9 to 14), M6 in the vicinity of Birmingham (junctions 4 to 10a), M6 in the vicinity of Manchester (and junctions 15 to 21a), M62 in the vicinity of Rochdale (junctions 18 to 21), M62 in the vicinity of Leeds (junctions 26 to 30), M42 in the vicinity of Solihull (junctions 3a to 7), M1 in the vicinity of...
Northampton and Rugby (junctions 15 to 17), M1 in the vicinity of Nottingham and Sheffield (junctions 28 to 35a), M4 in the vicinity of Slough (junction 4b to 7), M4 in the vicinity of Cardiff (junctions 30 to 33).

**Additional information**

**Wst 02 calculator**

The Wst 02 calculator combines scores for regional mineral depletion, social cost of transport and carbon footprint. Each of these metrics has an equal weighting in the scoring tool, with a maximum score of 3 for each metric, giving a maximum Sustainable Aggregate Point score of 9.

- The regional mineral depletion is measured using the Abiotic Depletion Potential, which is determined by the aggregate type and the region where it is sourced.
- The social cost of transport reflects expenses to society that arise from additional congestion, respiratory disorders, accidents, noise, taxation and infrastructure maintenance associated with transport.
- The carbon footprint score is determined by the aggregate type, the transport mode and the distance travelled.

The data used to build the Wst 02 tool is based on extensive analysis of existing dataset and reference sources including: the Crown Estate, British Marine Aggregates Producers Association, Mineral Products Association; Department of the Environment, Food and Rural Affairs, Waste Resources Action Programme, Building Research Establishment, Environment Agency and Industry data from rail, aggregate and concrete industries.

Table 66, Table 67 and Table 68 summarise the datasets used by the Wst 02 tool.

**Table 66 Aggregate regional abiotic depletion potential**

<table>
<thead>
<tr>
<th>Region</th>
<th>Rock</th>
<th>Land sand and gravel</th>
<th>Marine dredged sand and gravel</th>
<th>Secondary and recycled materials</th>
</tr>
</thead>
<tbody>
<tr>
<td>North East</td>
<td>8.9 x 10^-5</td>
<td>8.9 x 10^-5</td>
<td>3.2 x 10^-6</td>
<td>0</td>
</tr>
<tr>
<td>Yorkshire and Humber</td>
<td>9.2 x 10^-9</td>
<td>0</td>
<td>6.4 x 10^-5</td>
<td>0</td>
</tr>
<tr>
<td>North West</td>
<td>2.4 x 10^-4</td>
<td>0.017</td>
<td>2.1 x 10^-5</td>
<td>0</td>
</tr>
<tr>
<td>East Midlands</td>
<td>1.7 x 10^-5</td>
<td>4.0 x 10^-4</td>
<td>1.0</td>
<td>0</td>
</tr>
<tr>
<td>West Midlands</td>
<td>4.9 x 10^-3</td>
<td>2.5 x 10^-4</td>
<td>1.0</td>
<td>0</td>
</tr>
<tr>
<td>East of England</td>
<td>0.35</td>
<td>2.0 x 10^-3</td>
<td>5.2 x 10^-6</td>
<td>0</td>
</tr>
<tr>
<td>London</td>
<td>1</td>
<td>2.7 x 10^-3</td>
<td>2.0 x 10^-7</td>
<td>0</td>
</tr>
<tr>
<td>South East</td>
<td>1.7 x 10^-4</td>
<td>0.015</td>
<td>2.6 x 10^-7</td>
<td>0</td>
</tr>
<tr>
<td>South West</td>
<td>6.3 x 10^-6</td>
<td>0</td>
<td>0.014</td>
<td>0</td>
</tr>
<tr>
<td>North Wales</td>
<td>5.2 x 10^-4</td>
<td>6.3 x 10^-3</td>
<td>0.17</td>
<td>0</td>
</tr>
<tr>
<td>South Wales</td>
<td>0</td>
<td>0</td>
<td>3.5 x 10^-6</td>
<td>0</td>
</tr>
</tbody>
</table>

The calculator tool uses an ADP value of ‘0’ when the resource is not currently depleting and a value of ‘1’ when no reserves are available.
Table 67 Social cost of transport

<table>
<thead>
<tr>
<th>Social cost (pence per tonne/km)</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Motorway (strategic)</td>
<td>3.9</td>
<td></td>
</tr>
<tr>
<td>Motorway (other)</td>
<td>0.6</td>
<td></td>
</tr>
<tr>
<td>A-road</td>
<td>3.6</td>
<td></td>
</tr>
<tr>
<td>Other road</td>
<td>10.2</td>
<td></td>
</tr>
<tr>
<td>Rail or water</td>
<td>0.2</td>
<td></td>
</tr>
</tbody>
</table>

UK quarries, concrete batching plants, precast concrete suppliers and asphalt plants that hold BES6001 certification can be found through GreenbookLive.

Table 68 Carbon footprint

<table>
<thead>
<tr>
<th>Aggregate type</th>
<th>kgCO $\text{^2}e$/tonne</th>
<th>kgCO $\text{^2}e$/tonne</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quarried stone</td>
<td></td>
<td>4.11</td>
</tr>
<tr>
<td>Sand and gravel</td>
<td></td>
<td>3.57</td>
</tr>
<tr>
<td>Recycled aggregates</td>
<td></td>
<td>4.65</td>
</tr>
<tr>
<td>Secondary aggregates</td>
<td></td>
<td>3.82</td>
</tr>
<tr>
<td>Marine dredged long haul</td>
<td>Marine sand or gravel</td>
<td>Yorkshire and Humber</td>
</tr>
<tr>
<td></td>
<td></td>
<td>North East</td>
</tr>
<tr>
<td></td>
<td></td>
<td>East of England</td>
</tr>
<tr>
<td></td>
<td></td>
<td>East Midlands</td>
</tr>
<tr>
<td>Marine dredged short haul</td>
<td>Marine sand or gravel</td>
<td>London</td>
</tr>
<tr>
<td></td>
<td></td>
<td>South East</td>
</tr>
<tr>
<td></td>
<td></td>
<td>North West</td>
</tr>
<tr>
<td></td>
<td></td>
<td>South West</td>
</tr>
<tr>
<td></td>
<td></td>
<td>North Wales</td>
</tr>
<tr>
<td></td>
<td></td>
<td>South Wales</td>
</tr>
<tr>
<td></td>
<td></td>
<td>West Midlands</td>
</tr>
<tr>
<td>Distribution method</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Road</td>
<td>0.07</td>
<td></td>
</tr>
<tr>
<td>Rail</td>
<td>0.011</td>
<td></td>
</tr>
<tr>
<td>Barge</td>
<td>0.008</td>
<td></td>
</tr>
<tr>
<td>Other aspects</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intermodal handling</td>
<td>0.15</td>
<td></td>
</tr>
<tr>
<td>Carbon penalty where recycled</td>
<td>11.2</td>
<td></td>
</tr>
<tr>
<td>or secondary aggregates are</td>
<td></td>
<td></td>
</tr>
<tr>
<td>used in ready-mix concrete</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

This does not represent the total carbon footprint of the concrete or asphalt product and should not be referenced as such.

Further guidance
The Environment Agency publishes and updates Quality Protocols at www.environment-agency.gov.uk
Current guidance

- Steel slag, incinerator bottom ash aggregates and furnace bottom ash (from coal fired power generation) are not covered by the above Quality Protocol but are or will be covered by their own quality protocols.
Wst 03 Operational waste

Aim

To encourage the recycling of operational waste through the provision of dedicated storage facilities and space.

Value

Helping to meet corporate and statutory waste recycling targets

– Reducing environmental impacts and costs arising from the disposal of operational waste

– Ensuring that occupants have the facilities to enable them to sort waste at source rather than paying for this to be carried out off site

– Providing convenient and well integrated waste storage areas in suitable locations

Context

It is a statutory requirement for local authorities and private sector organisations to meet increasing recycling targets. The aim is to reach higher amounts of recyclable and reusable waste that is re-processed as useful materials.
It is therefore important to provide sufficient storage areas within the building to reflect the recyclable waste streams that are generated and then collected by the local waste authority. This makes it as clear and convenient as possible for the building users to separate waste at source and encourage the reduction of waste to landfill.

Assessment scope

<table>
<thead>
<tr>
<th>Applicable Assessment criteria</th>
<th>Fully fitted</th>
<th>Simple building</th>
<th>Shell and core</th>
<th>Shell only</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assessment type specific notes</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>None</td>
</tr>
</tbody>
</table>

**Building type specific**

**2.0 Small industrial units** For an industrial building or development site consisting of a number of smaller units, each ≤ 200 m² floor area, shared facilities that meet the above criteria for the building or site as a whole are sufficient to achieve this credit.

**2.1 Shopping centres and retail parks** 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 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 Home composting information leaflet (multi-residential buildings)** 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.);
- 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 Secure accommodation** For a secure accommodation unit, compliance should be based on visitors (not beds).

**2.4 Multi-residential supported living facility** Where it is not possible to locate the recycling bins within a communal area accessible to residents for safety reasons (e.g. where the residents have mental health problems and free access to these facilities would 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.

**2.5 Healthcare buildings and country-specific guidance** In addition to the standard criteria, the waste facilities are compliant with the relevant NHS guidelines for that part of the UK.

**England**
Use HTM07-01 (England version) where the criterion refers to the use of relevant NHS guidelines for the country.

**Northern Ireland**
Use HTM07-01 (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.
Wst 03 Operational waste

Assessment criteria

One credit - Operational waste
1. Provide a dedicated space for the segregation and storage of operational recyclable waste generated. The space is:
   1.a. Clearly labelled, 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 collection 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. For consistent and large amounts of operational waste generated, provide:
   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 OR adequate spaces for storing segregated food waste and compostable organic material for collection and delivery to an alternative composting facility
   2.c. A water outlet provided adjacent to or within the facility for cleaning and hygiene purposes where organic waste is to be stored or composted on site.

Additionally for healthcare buildings only
3. The specified or installed operational waste facilities are compliant with the relevant NHS guidelines for that part of the UK.

Additionally for multi-residential buildings with self-contained dwellings or bedsits only
4. Provide three internal storage containers for each dwelling or bedsit with:
   4.a. A minimum total capacity of 30 litres
   4.b. No individual container smaller than 7 litres
   4.c. All containers in a dedicated non-obstructive position
   4.d. Storage containers for recycling in addition to non-recyclable waste storage

5. Provide home composting facilities and a home composting information leaflet within the kitchen area or communal space for each self-contain dwelling or bedsit

Additionally for multi-residential buildings with individual bedrooms and communal facilities only
6. Meet criteria 4.a and 4.b for self-contained dwellings or bedsits for every six bedrooms

7. Locate recyclable storage in a dedicated non-obstructive position in:
   7.a. Communal kitchens OR
7.b: Communal space such as communal lounges or utility areas, if no communal kitchens are present

8. Provide home composting facilities and a home composting information leaflet within the kitchen area or communal space

9. Internal composting waste storage is a minimum of 10 litres in volume for all homes

**Compliance notes**

Compliance notes are located in Appendix G – Notes for compliance on page 18 for the consultation. These compliance notes will be available through the knowledge base when the scheme goes live.

### Methodology

**Determining if the dedicated space complies.**

See criteria 1 and 2

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, use the following guide for minimum storage space provision:

1. At least 2m$^2$ per 1000m$^2$ of net floor area for buildings $<$ 5000m$^2$
2. A minimum of 10m$^2$ for buildings $\geq$ 5000m$^2$
3. An additional 2m$^2$ per 1000m$^2$ of net floor area where catering is provided (with an additional minimum of 10m$^2$ for buildings $\geq$ 5000m$^2$).

The net floor area should be rounded up to the nearest 1000m$^2$.

### General waste

The storage area for recyclable materials must be in addition to areas and facilities provided for dealing with general waste and other waste management facilities, e.g. compactors, balers and composters.

### Internal storage areas

Where the facilities are situated internally, vehicular gate heights, widths and manoeuvring and loading space must be sized to ensure ease of access for vehicles collecting recyclable materials.

### Evidence

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Interim design stage</th>
<th>Final post-construction stage</th>
</tr>
</thead>
<tbody>
<tr>
<td>All</td>
<td>One or more of the appropriate evidence types listed in The BREEAM evidential requirements on page 38 can be used to demonstrate compliance with these criteria.</td>
<td></td>
</tr>
</tbody>
</table>
Definitions

Accessible space
Accessible space is typically within 20m 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 20m of a building entrance. In such circumstances, judgment on whether the space is ‘accessible’ to the building occupants and vehicle collection must be made.

Clinical waste
Waste-derived from medical practices and defined as bodily fluids and wastes, drugs and medical equipment; and other waste which, unless rendered safe, may prove hazardous or infectious to persons coming into contact with it.

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
The largest and primary tenant within a retail development, typically department store-type retailers.

Recyclable storage
The following footprint dimensions (informed by the Metric handbook, Planning and design data) 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 x 2.4m
2. Skip: the footprint of an 8 and 12 cubic yard skip measures 3.4m x 1.8m, therefore allow a minimum of 2.0m width and 4.0m length or 8m² area for the storage and access of such containers
3. Wheeled bins: 360 litre = 0.86m x 0.62/660 L= 1.2m x 0.7m/1100 L= 1.28m x 0.98m
4. Roll-on-roll-off containers: allow a minimum of 6.1m x 2.4m
5. Vehicle access: the following are dimensions for lorry types that are typically used to collect waste. Therefore gate height and widths should not be smaller than these measurements:
   a. Dustcart: medium capacity; length = 7.4m Height = 4m width 3.1m
   b. Skip lorry: length = 7m Height = 3.35m width 3.1m.

Consideration must also be given to any other types of vehicle requiring access to this area, e.g. lorries for roll on/off containers.

Individual recycling bins located at convenient locations throughout the building are necessary to maximise recycling rates.

Waste compactor or baler
A machine that is designed to compress waste streams in order to improve storage and transport efficiency.

Additional information

None.
Wst 04 Speculative floor and ceiling finishes

Aim

To minimise the wastage associated with the installation of floor and ceiling finishes in lettable areas in speculative buildings where tenants have not been involved in their selection.

Value

- Reduce costs associated with the procurement, installation, removal and disposal of materials following letting of tenants’ areas
- Avoid environmental impacts associated with the disposal of speculative materials
- Promote responsible selection of floor and ceiling finishes and their maintenance during occupation and operation, to avoid unnecessary costs, time and disruption

Context

It is common practice for carpets and other floor finishes to be installed throughout office buildings built as speculative developments. However, once tenants occupy the buildings they often replace the floor finishes to suit their particular requirements, resulting in the original materials being wasted as it is rarely possible for them to be
reused elsewhere. In a typical office development, floor finishes are responsible for approximately one third of the total embodied impacts.

Assessment scope

<table>
<thead>
<tr>
<th>Applicable Assessment criteria</th>
<th>Fully fitted</th>
<th>Simple building</th>
<th>Shell and core</th>
<th>Shell only</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assessment type specific notes</td>
<td>None</td>
<td>None</td>
<td>See ref. 1.0</td>
<td>None</td>
</tr>
</tbody>
</table>

### Assessment type specific

1.0 Where the developer has not specified or installed any floor or ceiling finishes for a shell and core assessed building, the requirements are met and the credit can be awarded.

### Building type specific

2.0 **Office: show area** 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 this credit.
Wst 04 Speculative floor and ceiling finishes

Assessment criteria

One credit - Speculative floor and ceiling finishes

Speculative office building types only
1. For tenanted areas where the future occupant is not known, install carpets, other floor finishes and ceiling finishes in a show area only.
2. Only install specified floor and ceiling finishes selected by the known occupant of a development. Alternatively, where only ceiling finishes and no carpets are installed, the building owner confirms that the first tenants will be refused permission to make substantial alterations to the ceiling finishes.

Compliance notes

Compliance notes are located in Appendix G – Notes for compliance on page 18 for the consultation. These compliance notes will be available through the knowledge base when the scheme goes live.

Methodology

None.

Evidence

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Interim design stage</th>
<th>Final post-construction stage</th>
</tr>
</thead>
<tbody>
<tr>
<td>All</td>
<td>One or more of the appropriate evidence types listed in The BREEAM evidential requirements on page 38 can be used to demonstrate compliance with these criteria.</td>
<td></td>
</tr>
</tbody>
</table>

Definitions

None.
Additional information

None.
Wst 05 Adaptation to climate change

Aim

To minimise the future need of carrying out works to adapt the building to take account of more extreme weather changes resulting from climate change and changing weather patterns.

Value

– Maximise asset resilience and value through consideration of the likely impacts of future climate change on the project.
– Reduce future risks to end user safety arising from extreme weather events and climate change.
– Contribute to business continuity, planning in response to the risks of extreme weather events and climate change.
– Reduce the need for future adaptation, maintenance, and disruption associated with responding to climate change and extreme weather events.

Context

Annual average UK temperature was 0.9°C higher during the period 2005-2014 compared to 1961-1990. Moreover, sea levels around the UK have risen by 15-20 centimetres since 1900\(^{192}\). These figures are forecast to continue to change as a result of climate change. At the same time, there are upward trends in rainfall across the UK. Higher levels of winter rainfall have been experienced often in increasingly heavy rainfall events leading to more
flooding and damage to buildings and infrastructure. These patterns are consistent with projections of more and heavier rainfall for the UK in a warmer global atmosphere.

These changes increase health and safety risks to people and the built environment, increasing costs and disruption for repair and adaptation. The building stock will largely remain as it currently is for the next 50 to 60 years, given the relatively low levels of replacement that are likely to occur.

Therefore, there is a need for strategies to mitigate the impact of these events on our building stock overall and in particular to ensure that new buildings are designed and constructed to minimise future risks while avoiding over specification and resource use in the meantime.

### Assessment scope

<table>
<thead>
<tr>
<th>Applicable Assessment criteria</th>
<th>Fully fitted</th>
<th>Simple building</th>
<th>Shell and core</th>
<th>Shell only</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assessment type specific notes</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>1 – 3</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
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<tbody>
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</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Building type specific</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
</tr>
</tbody>
</table>
Wst 05 Adaptation to climate change

Assessment criteria

One credit - Resilience of structure, fabric, building services and renewables installation

1. Conduct a climate change adaptation strategy appraisal by the end of Concept Design (RIBA Stage 2 or equivalent) using:
   1.a: A systematic risk assessment to identify the impact of expected extreme weather conditions arising from climate change on the building over its projected life cycle. The assessment covers the installation of building services and renewable systems, as well as structural and fabric resilience aspects and includes (see Methodology on the next page):
      1.a.i Hazard identification
      1.a.ii Hazard assessment
      1.a.iii Risk estimation
      1.a.iv Risk evaluation
      1.a.v Risk management.

2. Develop recommendations or solutions based on the climate change adaptation strategy appraisal, during or prior to Concept Design (RIBA Stage 2 or equivalent), that aim to mitigate the identified impact.

3. Provide an update during Technical Design (RIBA Stage 4 or equivalent) demonstrating how the recommendations or solutions proposed at Concept Design have been implemented where practical and cost effective. Omissions have been justified in writing by the assessor.

Exemplary level criteria – Responding to climate change

Achievement of the following criteria demonstrates a holistic approach to the design and construction of the building’s life cycle to mitigate against the impacts of climate change.

To achieve an exemplary performance credit:

4. Meet criteria 1 above to 3 above.

5. Meet the criteria or achieve credits of the assessment issues given in Table 69 below.

<table>
<thead>
<tr>
<th>Issue</th>
<th>Requirements</th>
<th>Link to Wst 05 issue</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hea 04 Thermal comfort</td>
<td>Criterion 6</td>
<td>Prevent increasing risks of overheating</td>
</tr>
<tr>
<td>Ene 01 Reduction of energy use and carbon emissions</td>
<td>A minimum of eight credits</td>
<td>Maximise energy efficiency to tackle likely energy demand and minimise resultant carbon emissions</td>
</tr>
<tr>
<td>Ene 04 Low carbon design</td>
<td>The passive design analysis credit</td>
<td>Maximise opportunities to avoid unnecessary carbon emissions</td>
</tr>
<tr>
<td>SD5078: BREEAM UK New Construction 2018 – Consultation draft</td>
<td></td>
<td></td>
</tr>
<tr>
<td>---------------------------------------------------------------------------------------------------------</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Compliance notes</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Compliance notes are located in Appendix G – Notes for compliance on page 18 for the consultation. These</td>
<td></td>
<td></td>
</tr>
<tr>
<td>compliance notes will be available through the knowledge base when the scheme goes live.</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Methodology</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>As a minimum follow these steps when completing the climate change adaptation strategy appraisal (see criterion 1)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Responsible individual</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Nominate an individual to co-ordinate the necessary work and to be responsible for the final report. For example, this could be a BREEAM AP if appointed.</td>
<td></td>
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</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Hazard identification</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Review the evidence and information from relevant bodies and resources (Additional information on page 367) to identify and understand the expected impacts of increased extreme weather events and climate change on the building. Relevant bodies include, but are not limited to, the following:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>a. Local authorities</td>
<td></td>
<td></td>
</tr>
<tr>
<td>b. Statutory bodies, e.g. Defra, Environment Agency, Northern Ireland Environment Agency (NIEA), Scottish Environment Protection Agency (SEPA) etc.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>c. Technical bodies, e.g. CIBSE, UK Climate Impacts Programme (UKCIP).</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. As a guide, all adaptation plans should consider the following impacts of climate change and extreme weather events and describe how the design mitigates against them, where appropriate:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>a. Flooding</td>
<td></td>
<td></td>
</tr>
<tr>
<td>b. Storms (including high winds)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>c. Cold events</td>
<td></td>
<td></td>
</tr>
<tr>
<td>d. Heat waves (including temperature increases)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>e. Drought (including reduced summer rainfall)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>f. Milder winters</td>
<td></td>
<td></td>
</tr>
<tr>
<td>g. Wetter winters (including increased moisture and driving rain)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>h. Warmer summers and increased solar radiation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>i. Temperature variation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>j. Precipitation, e.g. rain and snow</td>
<td></td>
<td></td>
</tr>
<tr>
<td>k. Subsidence or ground movement</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Identify likely hazards.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Hazard assessment</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Identify the likelihood and the magnitude or scale of the hazards identified.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
This includes climate change scenarios and their potential impact throughout the lifetime of different building elements.

**Risk estimation**
1. Identify the risk presented by these hazards to the building and the likely impact of the hazards taking into account the following aspects as a minimum:
   a. Structural stability
   b. Structural robustness
   c. Weather proofing and detailing
   d. Material durability
   e. Health and safety of building occupants and others
   f. Impacts on building contents and business continuity.

**Risk evaluation**
1. Evaluate the potential impact of these risks on the building.
2. Determine the tolerable risk threshold.
3. Check the sensitivity of the risk assessment (see Definitions below).
4. Identify areas where the risks are unacceptable in health and safety, life cycle assessment and financial terms.

**Risk management**
1. Identify risk reduction measures.
2. Mitigate the hazards as far as is practically feasible.
3. Adapt the design and specification to incorporate the measures identified by the risk assessment in the final design.

### Evidence

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Interim design stage</th>
<th>Final post-construction stage</th>
</tr>
</thead>
<tbody>
<tr>
<td>All</td>
<td>One or more of the appropriate evidence types listed in The BREEAM evidential requirements on page 38 can be used to demonstrate compliance with these criteria.</td>
<td></td>
</tr>
</tbody>
</table>

### Definitions

**Durability**
The ability to withstand wear, pressure or damage.

**Hazard**
A hazard is a situation or event which has the potential to cause harm. It may be an accidental or a malicious action, insufficient strength or resistance, or excessive deviation from intended limits.

**Resilience**
The ability of a building or structural system or material to withstand an accidental or exceptional loading or other incident without experiencing an undue degree of damage or decrease in performance, such that progressive
collapse, loss of performance or disproportionate degree of damage occurs.

**Sensitivity of the risk assessment**

Sensitivity analysis is a technique used to determine how changing the values of a variable will alter a dependent variable under a given set of assumptions. Where several values could be changed to affect a dependent variable, changes need to be made one at a time. For example, the use of different climate change scenarios would alter the hazards of the development.

**Structural and fabric resilience**

BREEAM defines this as the ability of a structure to withstand an increased burden of weather, increased pressure or hazards associated with climate change. Examples of increased pressures or hazards to be considered include the impacts of climate change and extreme weather events described in the Methodology on page 364 section under Hazard identification.

**Systematic risk assessment**

A structured approach to help professionals identify, evaluate and manage risk, where the reduction of the risks identified is integral to the process. It includes:

1. Identifying the hazards
2. Eliminating the hazards, as far as reasonably practicable
3. Reducing the risks from each hazard, as far as reasonably practicable
4. Developing the building design to be robust.

### Checklists and tables

**Table 70 below** is an example of a climate change adaptation strategy appraisal for a selection of building elements and climate change impacts. This example is not a complete appraisal, but illustrates some of the content that should be included in the appraisal.

**Table 70** Climate change adaptation strategy appraisal examples

<table>
<thead>
<tr>
<th>Hazard</th>
<th>Climate change hazard</th>
<th>Hazard assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hazard scale</td>
<td>High</td>
<td>High</td>
</tr>
<tr>
<td>Building element</td>
<td>Ground floor flooring material</td>
<td>Façade finishing materials</td>
</tr>
<tr>
<td>Building element lifetime</td>
<td>10–15 years</td>
<td>10 years</td>
</tr>
<tr>
<td>Hazard likelihood</td>
<td>High</td>
<td>High</td>
</tr>
<tr>
<td>Impact magnitude</td>
<td>Medium</td>
<td>Medium</td>
</tr>
</tbody>
</table>

**Risk**

<table>
<thead>
<tr>
<th>Risk estimation</th>
<th>Flooring material becomes unusable and needs to be changed. Potential health risks associated to dampness. Potential impact on business continuity.</th>
<th>Façade finishing materials are not affected by cold, but primarily by snow, strong winds and rain</th>
</tr>
</thead>
<tbody>
<tr>
<td>Risk evaluation</td>
<td>Risk assessment sensitivity: flooding has a high likelihood under all scenarios. Health risks are beyond the tolerable risk threshold.</td>
<td>Risk assessment sensitivity: flooding has a high likelihood under all scenarios. No health risks identified.</td>
</tr>
<tr>
<td>Risk reduction measure</td>
<td>Select a flood-resistant flooring material</td>
<td>None</td>
</tr>
</tbody>
</table>

Checklists and tables
Additional information

The following resources for climate change scenarios and impacts are available:

1. Relevant Intergovernmental Panel on Climate Change (IPCC) report on Impacts of Climate Change and Adaptation(193)
2. UK Climate Change Risk Assessment(194)
3. Climate Change Impacts www.climatejust.org.uk
4. Developing H++ climate change scenarios for heat waves, droughts, floods, windstorms and cold snaps (195)

The following resources for best practice design guidance are available:

5. The Environmental Design Pocketbook(196)
6. Adaptation resources: www.climatejust.org.uk/resources
7. Adaptation or retrofitting(197)
9. Design for climate change(198)

The book 'Design for climate change' describes buildings and issues as part of the Design for Future Climate, Adapting Buildings programme, the largest programme focusing on the climate change adaptation of buildings in the UK. This programme from the Technology Strategy Board (TSB) aims to improve the climate resilience of building projects. The book has guidance on construction, including structural stability.

10. The UKCIP Adaptation Wizard v4.0 2013: www.ukcip.org.uk/wizard/about-the-wizard/
11. Potential costs and benefits of adaptation options: A review of existing literature(199). This is a technical paper by the United Nations Framework Convention on Climate Change (UNFCCC), which reviews methods of costing adaptation options and assessing their benefits.
12. National Adaptation Programme 2013(200)

The National Adaptation Programme report has been drawn up by the government, industry and other non-government organisations working together. It contains a mix of policies and actions to help the UK to adapt successfully to future weather conditions, by dealing with the risks and making the most of the opportunities.

13. Potential implications of climate change in the built environment(201)

The BRE report 'Potential implications of climate change in the built environment', discusses climate change adaptation strategies, including some for structural resilience
Wst 06 Design for disassembly and adaptability

Aim

To avoid unnecessary materials use, cost and disruption arising from the need for future adaptation works as a result of changing functional demands, climatic change and to maximise the ability to reclaim and reuse materials at final demolition in line with the principles of a circular economy.

Value

- Reduced waste and cost associated with future refurbishment or fit-out works and ultimately in demolition.
- Improved the ability to cost-effectively reuse and recycle materials.
- Increased the lifetime value of materials and products.
- Encourage consideration of circular economy principles during design and construction.
- Reduced costs and disruption associated with the need for future adaptation, demolition and strip-out, and therefore reducing the associated waste and costs.

Context

The construction industry is responsible for approximately 60% of total UK materials use and one third of all waste produced\(^1\). At least 17 million tonnes of inert waste are produced by the UK construction industry\(^2\). Typically buildings are stripped out or in many cases even demolished considerably earlier than their design life would predict or structural stability require. In most cases only high value materials are reclaimed or reused and
many resources are either used for low grade uses, taken to landfill or in some cases, even illegally dumped leading to increased environmental damage and costs to local authorities and society. This risk can be reduced by considering building adaptability and also future disassembly to allow easy material separation and reuse. This includes exposed and reversible connections, layer independence and standardisation which can facilitate disassembly.

Assessment scope

<table>
<thead>
<tr>
<th>Applicable Assessment criteria</th>
<th>Fully fitted</th>
<th>Simple building</th>
<th>Shell and core</th>
<th>Shell only</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assessment type specific notes</td>
<td>None</td>
<td>see ref 1.0</td>
<td>None</td>
<td>None</td>
</tr>
</tbody>
</table>

### Building type specific

1.0 Criterion 5 is not applicable to prison buildings.

1.1 Healthcare buildings Some openings in public and patient areas need to be provided with restricted opening distances of not more than 100mm (HBN 00-10 Part D: Windows and associated hardware(204)). This is for health and safety reasons, especially where windows are within reach of the elderly, mentally ill or children. However, it is felt that good design can overcome these restrictions and provide compliant natural ventilation solutions, even in safety-sensitive areas.

1.2 Industrial buildings Criterion 5 only applies to office areas and not to operational ones. If the building does not contain any office areas, this criterion is not applicable.
Wst 06 Design for disassembly and adaptability

Assessment criteria

One credit - Design for disassembly and functional adaptability
1. Conduct a study to explore the ease of disassembly and the functional adaptation potential of different design scenarios (see Functional adaptation strategy study and Ease of disassembly by Concept Design (RIBA Stage 2 or equivalent)).

2. Develop recommendations or solutions (see Functional adaptation implementation) based on the study (criterion 1 above), during or prior to Concept Design (RIBA Stage 2 or equivalent), that aim to enable and facilitate disassembly and functional adaptation.

3. Provide an update, during Technical Design (RIBA Stage 4 or equivalent), on
   3.a: How the recommendations or solutions proposed by Concept Design have been implemented where practical and cost effective. Omissions have been justified in writing to the assessor.
   3.b: Changes to the recommendations and solutions for the development during the development of the Technical Design.

4. Produce a building adaptability guide to communicate the characteristics allowing functional adaptability and disassembly to prospective tenants.

One credit - Adaptability: Potential for natural ventilation (credit not applicable to prison buildings)
5. Design the building ventilation strategy to be flexible and adaptable to potential building occupant needs and climatic scenarios. This can be demonstrated as follows:
   5.a: Design occupied spaces of the building so that they are capable of providing fresh air entirely via a natural ventilation strategy. The following are methods deemed to satisfy this criterion dependent upon the complexity of the proposed system:
      5.a.i Design room depths in accordance with CIBSE AM10(205) (section 2.4) to ensure effectiveness of any natural ventilation system. The opanable window area in each occupied space is equivalent to 5% of the gross internal floor area of that room or floor plate;

OR

5.a.ii The design demonstrates that the natural ventilation strategy provides adequate cross flow of air to maintain the required thermal comfort conditions and ventilation rates. This is demonstrated using ventilation design tool types that meet the requirements of CIBSE AM10 (or for education buildings by using the ClassVent tool).

5.b: For a strategy which does not rely on opanable windows, or which has occupied spaces with a plan depth greater than 15m, the design must demonstrate (in accordance with criterion 5.a above) that the ventilation strategy can provide adequate cross flow of air to maintain the required thermal comfort conditions and ventilation rates.
Compliance notes

Compliance notes are located in Appendix G – Notes for compliance on page 18 for the consultation. These compliance notes will be available through the knowledge base when the scheme goes live.

Methodology

Functional adaptation strategy study

The study must consider the following as a minimum:

- **Feasibility**: The likelihood to contain multiple or alternative building uses and area functions over the expected life cycle, e.g. related to the structural design of the building.
- **Accessibility**: Design aspects that facilitate the replacement of all major plant within the life of the building, e.g. panels in floors and walls that can be removed without affecting the structure, providing lifting beams and hoists. Accessibility also involves access to local services, such as local power, data infrastructure etc.
- **Versatility**: The degree of adaptability of the internal environment to accommodate changes in working practices.
- **Convertibility**: The degree of adaptability of the internal physical space and external shell to accommodate changes of in-use.
- **Expandability**: The potential for the building to be extended, horizontally or vertically.
- ‘Refurbishment potential’: The potential for major refurbishment, including replacing the façade.

For additional guidance, see Table 71 on page 373.

Functional adaptation implementation

The implementation will be specific to the building and scope of the project, but information should be made available to the assessor covering:

- Options for multiple building uses and area functions based on design details, e.g. modularity.
- Routes and methods for major plant replacement, e.g. networks and connections have flexibility and capacity for expansion.
- Accessibility for local plant and service distribution routes, e.g. detailed information on building conduits and connections infrastructure.
- The potential for the building to be extended, horizontally or vertically.

Ease of disassembly

Ease of disassembly is facilitated by principles allowing the building or parts of the building to be disassembled at the end of its life, or to be renovated rather than demolished, with individual components being used for other purposes. The study should consider the following as a minimum:

- **Accessibility** (see Functional adaptation strategy study).
- **Durability**: use materials which require less frequent maintenance, repair or replacement, considering them within the context of the life span of the building.
- **Exposed and reversible connections**: making the connections more visible provides opportunities to optimise material and product reuse. Welded connections prohibit disassembly and it is preferable to use screws and bolts to allow for disassembly and material reuse.
- **Layer independence**: designing building systems and components in layers so that removal, adjustment or replacement of some elements is feasible, especially when different components have different life spans and maintenance needs.
- **Avoidance of unnecessary toxic treatments and finishes**: Some finishes can contaminate the substrate in a way that they are no longer reusable or recyclable. This should be avoided unless finishes serve a specific purpose.
Standardisation can accommodate reuse and upgrading. It involves aspects such as dimensions, components, connections and modularity.

For additional information, see Table 72 on page 374.

**Mechanically ventilated or cooled buildings**

See criterion 5 on page 370.

Buildings that employ a mechanically ventilating or cooling strategy are still able to achieve this credit provided it can be demonstrated that the features required by the criteria can be made easily available to the building user, e.g. windows fixed shut for an air-conditioned strategy can be modified to be opening windows. The aim of the potential for natural ventilation criteria is to ensure that a building is capable of providing fresh air using a natural ventilation strategy. Where the building is predominantly naturally ventilated, but mechanical ventilation is necessary to boost ventilation during peak conditions, (i.e. maximum occupancy and peak temperature conditions) due to the function or specific usage patterns of the building, the potential for the natural ventilation credit can still be awarded provided calculations or modelling demonstrate that the mechanical ventilation system will be required for ≤ 5% of the annual occupied hours in the occupied spaces for the adopted building design or layout.

**Evidence**

<table>
<thead>
<tr>
<th>Ref</th>
<th>Interim design stage</th>
<th>Final post-construction stage</th>
</tr>
</thead>
<tbody>
<tr>
<td>All</td>
<td>One or more of the appropriate evidence types listed in the BREEAM evidential requirements on page 38 can be used to demonstrate compliance with these criteria.</td>
<td>As per interim design stage.</td>
</tr>
<tr>
<td>All</td>
<td>Disassembly and functional adaptability study, implementation plan report, building adaptability guide.</td>
<td></td>
</tr>
</tbody>
</table>

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 RIBA 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.

The BREEAM Assessor should use their judgment in determining whether the aim and intent of the credit has been met using appropriate project information to back their judgment. BRE Global will endorse the BREEAM Assessor’s judgment through the Quality Assurance audit where a reasonable justification to award the credit on the basis of project team actions and proposed design solutions is evident.

**Definitions**

**Building adaptability guide**

The guide can be in the form of an analogue document or an Asset Information Model from the Building Information Model (BIM) created in accordance with PAS 1192 Part 2-2013 and PAS 1192 Part 3-2014. See the new ISO 20887 for information on what the guide could include.

**Building functional adaptability**

Work to an existing building that responds to a required change of use or requirements and goes beyond maintenance and repairs. These changes solve functional problems and could provide significant improvements.
The functional adaptation works could include alterations, conversions or extensions.

**Functional adaptability**

The ability of a building to be adapted for a change in operational requirements within the same building type or for use as a different building type.

**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. Please note there is a specific, unrelated, definition of ‘unoccupied’ with reference to acoustic testing and measurement and this should not be confused with the definition used here.

**Additional information**

The Health Technical Memorandum 07-07(208) includes guidance on future-proofing healthcare buildings.

A new ISO(20887) focusing on the ‘Design for disassembly and adaptability of buildings and civil engineering works’ is expected to be published.

**Table 71** below provides examples of functional design measures that may be adopted for each assessment part when considering accessibility, spatial adaptability and expandability.

<table>
<thead>
<tr>
<th>Table 71</th>
<th>Design measures allowing future adaptation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Accessibility</strong></td>
<td><strong>Spatial adaptability</strong></td>
</tr>
<tr>
<td>Fabric and structure:  - External walls  - Cladding  - Ground and first floor  - Roof</td>
<td>Use of products or systems which allow easy replacements</td>
</tr>
<tr>
<td>Core and local services:  - Mechanical and electrical  - Plumbing  - Stairs and lifts  - Fire</td>
<td>Inclusion of facilities management requirements and construction design management feedback for future operational needs.</td>
</tr>
<tr>
<td>Interior design:  - Finishes  - Floors  - Interior walls  - Connections</td>
<td>Use of products or systems which allow easy replacements.</td>
</tr>
</tbody>
</table>

**Table 72 on the next page** provides examples of considerations when designing for disassembly.
Table 72  Examples of design measures and aspects to consider regarding future disassembly

<table>
<thead>
<tr>
<th>Principles for disassembly</th>
<th>Examples of design measures and aspects to consider</th>
</tr>
</thead>
</table>
| Durability                 | – Durability of different building elements based on warranties and risk of being broken during disassembly  
|                            | – Consider building elements within the context of the building life span and the building sector  
|                            | – Use of temporary structures when a short life span is expected |
| Exposed and reversible connections | – 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 |
| Layer 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 |
| 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

<table>
<thead>
<tr>
<th></th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fully fitted</td>
<td>13%</td>
</tr>
<tr>
<td>Simple building</td>
<td>12.5%</td>
</tr>
<tr>
<td>Shell &amp; core</td>
<td>15.5%</td>
</tr>
<tr>
<td>Shell only</td>
<td>19%</td>
</tr>
</tbody>
</table>

Summary
This category encourages sustainable land use, habitat protection and creation, and improvement of long term biodiversity for the building’s site and surrounding land. Issues in this section relate to the reuse of brownfield sites or those of low ecological value, mitigation and enhancement of ecology and long term biodiversity management.

LE 01 Site selection 2 credits
- Recognition of the reuse of previously developed and contaminated land where appropriate remediation has taken place.
LE 01 Site selection

Aim

To encourage the use of previously occupied or contaminated land and avoid land which has not been previously disturbed.

Value

– Avoids the use of greenfield land therefore reducing the environmental impact of the development
– Regeneration provides social and economic benefits to the development and the surrounding local community
– Remediation removes threats to health and safety, and enables land, to be improved that would otherwise be left.

Context

Brownfield redevelopment not only cleans up environmental health hazards and eyesores, but also stimulates community regeneration, particularly when communities input into the consultation process. The reclamation and reuse of previously developed sites also aligns with Government policies to increase the uptake of brownfield land, and allows us to preserve existing biodiversity by reducing our reliance on greenfield land.
## Assessment scope

<table>
<thead>
<tr>
<th></th>
<th>Fully fitted</th>
<th>Simple building</th>
<th>Shell and core</th>
<th>Shell only</th>
</tr>
</thead>
<tbody>
<tr>
<td>Applicable Assessment criteria</td>
<td>All</td>
<td>All</td>
<td>All</td>
<td>All</td>
</tr>
<tr>
<td>Assessment type specific notes</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>None</td>
</tr>
</tbody>
</table>

### Assessment type specific

None

### Building type specific

| 2.0  | Education (schools only) - Playing fields  
Development of a playing field within the development footprint can be counted as development on previously occupied land only if an equivalent area of playing field is reinstated within one year of the completed construction works; and where such reinstatement will not encroach on land of high ecological value. |
| 2.1  | Prisons  
All land within a secure perimeter fence on an existing prison sites can be classified as previously occupied land. Therefore assessments of buildings located within this area will achieve the credit.  
If the secure perimeter fence of a prison is being extended to accommodate the proposed building, or the proposed building is located on a completely new site, then the building must comply with the assessment criteria defined above. |
LE 01 Site selection

Assessment criteria

This issue is split into two parts:
– Previously occupied land (1 credit)
– Contaminated land (1 credit)

One credit - Previously occupied land
1 At least 75% of the proposed development’s footprint is on an area of land which has previously been occupied (see Definitions on the facing page).

One credit - Contaminated land
2 A contaminated land professional’s site investigation, risk assessment and appraisal has deemed land within the site to be affected by contamination. The site investigation, risk assessment and appraisal have identified:
   2.a: The degree of contamination
   2.b: The contaminant sources or types
   2.c: The options for remediating sources of contamination which present an unacceptable risk.
3 The client or principal contractor confirms that remediation of the site will be carried out in accordance with the remediation strategy and its implementation plan as recommended by the contaminated land professional (see Definitions).

Compliance notes
Compliance notes are located in Appendix G – Notes for compliance on page 18 for the consultation. These compliance notes will be available through the knowledge base when the scheme goes live.

Methodology

Previously developed land - Infill sites
When assessing new buildings developed within the boundary of an existing site, they do not automatically comply with the reuse of land criteria. At least 75% of the land on which the new building will be sited must meet the definition of ‘previously occupied’ (for prisons, refer the Assessment Scope section).

Contaminated Land - Scope
Contaminated land that has been decontaminated solely for health and safety reasons, or for historic remediation (rather than for the specific purpose of re-development) is not within the scope of the assessment. The credit for use of contaminated land can only be awarded where remediation has taken place to enable development of the site for the assessed building, or a larger phased development that includes the assessed building.
Contaminated land - Large sites split into smaller plots

When assessing a large site that has been remediated and then packaged up into smaller plots of land for individual buildings (possibly as part of a phased development strategy), the credit can be awarded regardless of the plot location of the assessed building within the wider development plan. This is on the condition that the site could not have been developed without remediation work taking place.

Evidence

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Interim design stage</th>
<th>Final post-construction stage</th>
</tr>
</thead>
<tbody>
<tr>
<td>All</td>
<td>One or more of the appropriate evidence types listed in The BREEAM evidential requirements on page 38 can be used to demonstrate compliance with these criteria.</td>
<td>Evidence to demonstrate the recommendations set out in the remediation strategy and implementation plan have been implemented.</td>
</tr>
<tr>
<td>3</td>
<td>A copy of the remediation strategy and implementation plan</td>
<td></td>
</tr>
</tbody>
</table>

Definitions

Contaminated land professional
An individual that holds a degree or equivalent qualification in chemistry, environmental science or management, earth sciences, civil engineering or a related subject, and has a minimum of three years relevant experience (within the last five years) in site investigation, risk assessment and appraisal. Such experience must clearly demonstrate a practical knowledge of site investigation methodologies and understanding of remediation techniques and national legislation on the subject; as well as acting in an advisory capacity to provide recommendations for remediation.

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 3m 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.

Land affected by contamination
Land that could not be legally or safely developed or built on to the proposed end use without the remediation of contamination. Contamination is defined as any substance or agent in, or on the ground within the development footprint, which presents an unacceptable risk to human health, property or the environment. For the purposes of BREEAM, substances or agents that could present unacceptable contamination risks are defined as those that act as a barrier to the development of land, which could include certain plant species such as, but not limited to, Japanese knotweed and giant hogweed.
Where asbestos is found to be present in the ground this is classed as contamination for the purposes of this issue. If asbestos is present in existing building fabric, the site cannot be classified as contaminated land.

Previously occupied land
For the purposes of this issue BREEAM defines previously occupied land as that which is or was occupied by a permanent structure, including any associated fixed surface infrastructure (the definition is based on the National Planning Policy Framework definition of previously developed land, with some further clarifications for items 3 and 4). The definition excludes:

1. Land that is or has been occupied by agricultural or forestry buildings.
2. Land that has been developed for minerals extraction or waste disposal by landfill purposes where provision for restoration has been made through development control procedures.
3. Land inbuilt-up areas such as parks, recreation grounds and allotments which, although they may feature paths, pavilions and other buildings, have not been previously occupied.
4. Land that was previously occupied but where the remains of the permanent structure or fixed surface structure have blended into the landscape in the process of time (to the extent that it can reasonably be considered as part of the natural surroundings), typically over a period of more than fifty years.

Proposed development
Any development (building, hard landscaping, car park and access roads) that falls within the boundary of the assessed site.

Remediation
Any activity undertaken to prevent, minimise, remedy or mitigate the risk caused by contaminated land to human health, the environment or local resources such as sources of potable water.

Additional information

None.
Pollution

Summary
This category addresses the prevention and control of pollution and surface water run-off associated with the building’s location and use. Issues in this section aim to reduce the buildings impact on surrounding communities and environments arising from light-pollution, noise, flooding and emissions to air, land and water.

Poll01 Impact of refrigerants 3 credits
– To reward buildings that reduce the impact of refrigerant gas emissions.

Poll02 Local air quality Up to 2 credits
– To recognise buildings which limit their impact on local air quality, by consideration of the combustion plant and fuel used on site.

Poll03 Flood and surface water management 5 credits
– To reward buildings and their sites that limit on and off-site local flooding and hence the damage this can lead to.

Poll04 Reduction of night time light pollution 5 credits
– Avoidance or reduction of the impact of night time light pollution, through careful design and specification of light sources.

Poll05 Reduction of noise pollution 5 credits
– Avoidance or reduction of the impact of external noise from the building.
Pol 01 Impact of refrigerants

Aim

To reduce the level of greenhouse gas emissions arising from the leakage of refrigerants from building systems.

Value

- Increase system resilience and market value through the use of low impact refrigerants in buildings.
- Minimising future liabilities and adaptation costs associated with changes to statutory requirements relating to refrigerant use.
- Limit the potential release and impact of refrigerant gases into the atmosphere.
- Assist in meeting corporate CSR reporting targets relating to refrigerant use.

Context

The typical refrigerants used in building cooling systems are major greenhouse gases that are many times more potent than carbon dioxide in their contribution to global warming and climate change. Although released in much smaller quantities they are, never the less, a significant contributor to increasing global temperatures. As such they are the focus of increasingly strict regulatory controls internationally and nationally. Worldwide agreements such as the 1992 United Nations Framework Convention on Climate Change (UNFCCC) and its extension the Kyoto Protocol commit signatories to reducing greenhouse gas emissions and banning the worst performing gases.
agreements seek to shift use to low impact refrigerants over time and so provide a timescale for the phasing out of more potent refrigerants because the use of the gases is widespread and key to industries across developed and developing countries.

BREEAM seeks to support this agenda and promote more rapid change by creating market value for developments with reduced impact refrigerants by limiting the volume or weight of gases used, their potential impact and for specifying systems which detect and control leakage of gas to the atmosphere.

**Assessment scope**

<table>
<thead>
<tr>
<th></th>
<th>Fully fitted</th>
<th>Simple building</th>
<th>Shell and core</th>
<th>Shell only</th>
</tr>
</thead>
<tbody>
<tr>
<td>Applicable Assessment criteria</td>
<td>All</td>
<td>Not applicable</td>
<td>All</td>
<td>Not applicable</td>
</tr>
<tr>
<td>Assessment type specific notes</td>
<td>None</td>
<td>None</td>
<td>See ref 1.0</td>
<td>None</td>
</tr>
</tbody>
</table>

**Assessment type specific**

1.0 If the building is designed to avoid the need for refrigerant containing building services, so no refrigerant use will be specified for the fit-out, the available credits can be awarded by default.

**Building type specific**

None
Pol 01 Impact of refrigerants

Assessment criteria

Three credits - No refrigerant use

1. Where the building does not require the use of refrigerants within its installed plant or systems. For Shell only assessments, if the building is designed in such a way that it avoids the need for refrigerant containing building services, and therefore no ‘refrigerant-using’ building services or systems will be specified for the fit-out, then the available credits can be awarded by default.

OR alternatively, where the building does require the use of refrigerants, the three credits can be awarded as follows:

Prerequisite

2. All systems (with electric compressors) must comply with the requirements of BS EN 378:2008\(^{(210)}\) (parts 2 and 3). Where refrigeration systems containing ammonia are installed, the Institute of Refrigeration Ammonia Refrigeration Systems code of practice\(^{(211)}\) must be complied with.

Impact of refrigerant

Two credits

3. Where the systems using refrigerants have direct effect life cycle CO\(_2\) equivalent emissions (DELC) of \(\leq 100\) kgCO\(_2e\)/kW. For systems which provide cooling and heating, the worst performing output based on the lower of kW cooling output and KW heating output must be used to complete the calculation. To calculate the DELC please refer to the relevant definitions in the Methodology on the facing page and Additional information on page 389 sections.

OR

4. Where air-conditioning or refrigeration systems are installed the refrigerants used have a Global Warming Potential (GWP) \(\leq 10\).

OR

One credit

5. Where the systems using refrigerants have DELC of \(\leq 1000\) kgCO\(_2e\)/kW cooling and heating capacity.

One credit - Leak detection

6. Where the system is hermetically sealed. See Hermetically sealed systems on page 388

OR

6.a: Where the system is not hermetically sealed.

6.a.i Systems using refrigerants have a permanent automated refrigerant leak detection system installed, that is robust and tested and capable of continuously monitoring for leaks.

OR
6.a.ii Where an inbuilt automated diagnostic procedure for detecting leakage is installed, which is enabled for detecting leaks.

6.b: In the event of a leak, the system must be capable of automatically responding and managing the remaining refrigerant charge to limit loss of refrigerant (see Automatic isolation and containment of refrigerant on page 389).

Compliance notes
Compliance notes are located in Appendix G – Notes for compliance on page 18 for the consultation. These compliance notes will be available through the knowledge base when the scheme goes live.

Methodology

BREEAM Pol 01 calculator

The number of Pol 01 BREEAM credits achieved is determined by the assessor using the BREEAM Pol 01 calculator.

The direct effect life cycle CO₂e emissions (DELc) per kW of cooling and heating capacity are calculated using the following equation:

\[
\frac{[\text{Refrigerant loss operational} + \text{refrigerant loss system retirement}] \times GWP}{\text{Cooling Capacity (kW)}}
\]

Where:

- Refrigerant loss operational: \( \text{Ref}_\text{charge} \times \text{Sys}_{\text{op-life}} \times (L1 + L2 + S1 + S2) / 100 \)
- Refrigerant loss system retirement = \( \text{Ref}_\text{charge} \times (1 - (\text{Ref}_\text{RecEff} / 100)) \)

Where:

1. \( \text{Ref}_\text{charge} \): Refrigerant charge (kg)
2. \( \text{Sys}_{\text{op-life}} \): System operational lifetime (years)
3. \( \text{Ref}_\text{RecEff} \): Refrigerant Recovery Efficiency factor (%)
4. \( L1 \): Annual Leakage Rate (units: % 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. Cooling and heating capacity (kW).

The following default values must be used, where system specific data are not available:

- \( \text{Sys}_{\text{op-life}} \): System operational design life (years): see Table 73 on the next page
- \( \text{Ref}_\text{RecEff} \): Refrigerant recovery efficiency factor (%): \( 95 \)
- \( L1 \): Annual leakage rates (% refrigerant charge): see Table 74 on the next page.
- \( L2 \): Annual purge release factor (% refrigerant charge): \( 0.5 \) (if the system does not require an annual purge, zero should be used).
- \( S1 \): Annual service release (% refrigerant charge): \( 0.25 \) (this applies where the system requires opening up to carry out the annual service. For systems which do not require opening up, there will be no associated annual release of refrigerant, therefore a default of zero should be used).
- \( S2 \): Probability factor for catastrophic failure (% refrigerant charge loss/year): \( 1 \) (based on a failure rate of 1 in 100 systems).
The following information must be sourced from the design team’s mechanical and electrical engineer or system manufacturer:

- System type
- $\text{Ref}_{\text{charge}}$: Refrigerant charge (kg)
- GWP: Global Warming Potential of refrigerants
- cooling and heating capacity (kW).

**Table 73** Default system operational design life values

<table>
<thead>
<tr>
<th>System type</th>
<th>Default system operational design life values (years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Small or medium capacity chillers</td>
<td>15</td>
</tr>
<tr>
<td>Large capacity chillers</td>
<td>20</td>
</tr>
<tr>
<td>Unitary split</td>
<td>15</td>
</tr>
<tr>
<td>Variable Refrigerant Flow (VRF) system</td>
<td>15</td>
</tr>
<tr>
<td>All other systems</td>
<td>10</td>
</tr>
</tbody>
</table>

These figures are based on those reported in LOT 6 for air-conditioning units and the British Refrigeration Association’s (BRA) Guideline Methods of Calculating TEWI (Total Equivalent Warming Impact)(2006)[212]. Note: The following should be considered when determining whether the system specified is defined as small, medium or large:

- Large capacity chiller: centrifugal compressor
- Medium capacity chiller: scroll or screw compressor
- Small capacity chiller: scroll compressor.

**Table 74** Default values for DELC calculation when manufacturer’s figures are not available

<table>
<thead>
<tr>
<th>System type</th>
<th>Annual leakage rate (% of charge per annum)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Cold storage and display systems</strong></td>
<td></td>
</tr>
<tr>
<td>Integral cabinets</td>
<td>3%</td>
</tr>
<tr>
<td>Split or condensing units</td>
<td>18%</td>
</tr>
<tr>
<td>Centralised</td>
<td>19%</td>
</tr>
<tr>
<td><strong>Air-conditioning systems</strong></td>
<td></td>
</tr>
<tr>
<td>Unitary split</td>
<td>15%</td>
</tr>
<tr>
<td>Small-scale chillers</td>
<td>10%</td>
</tr>
<tr>
<td>Medium or large chillers</td>
<td>5%</td>
</tr>
<tr>
<td>Heat pumps</td>
<td>6%</td>
</tr>
</tbody>
</table>

These figures are based on those reported in LOT 6 for air-conditioning units and also Table 2 of the Market Transformation Programmes Briefing Note for Commercial Refrigeration no. 36, ‘Direct Emission of Refrigerant Gases’ (version 1.2). The figures are based on the average of the leakage rates from the four separate studies reported in Table 2 (where a range is reported, the higher value was used).

**Specification of multiple systems**

Where more than one air-conditioning or refrigeration system is installed in the building, the assessor must source the relevant technical data for each system and enter it into the Pol 01 calculator. The calculator will then determine the weighted average DELC for the multiple installation and the BREEAM credits can be awarded or withheld accordingly.

**Leak detection**

The refrigerant leak detection criteria are still applicable in instances where any type of non-solid refrigerant is present, i.e. even if the refrigerant meets BREEAM’s DELC CO₂e benchmarks. Exceptions to this are systems that use natural and environmentally benign refrigerants, such as air and water (for example lithium bromide or water absorption chillers) and installations of small multiple hermetic systems. These types of system or refrigerants will achieve the leak detection credit by default. See criterion 6 on page 384.
District cooling systems

Where a project is connected to a district cooling system which is outside the scope of the project or the wider development (for example 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.

Evidence

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Interim design stage</th>
<th>Final post-construction stage</th>
</tr>
</thead>
<tbody>
<tr>
<td>All</td>
<td>One or more of the appropriate evidence types listed in The BREEAM evidential requirements on page 38 can be used to demonstrate compliance with these criteria.</td>
<td></td>
</tr>
<tr>
<td>3, 5</td>
<td>Completed copy of the Pol01 Calculator tool</td>
<td>As per interim design stage</td>
</tr>
<tr>
<td>3, 5</td>
<td>Documentary evidence supporting the data used to complete the calculator tool.</td>
<td>As per interim design stage</td>
</tr>
</tbody>
</table>

Definitions

Direct effect life cycle (DELC) carbon dioxide equivalent

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: kg CO₂ eq.). The calculation involves estimating the total refrigerant release over the period of operation and subsequent conversion to an equivalent mass of carbon dioxide. Should the system use several different refrigerants, e.g. a primary refrigerant and a secondary coolant, or a cascade system, individual calculations are made for all refrigerants which contribute to the direct effect (see Methodology on page 385 section for a description of how DELC is calculated).

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 (Building Management System). Various sensor types are available including infra-red, semi-conductor or electro-chemical.

Refrigerant recovery

The process of removing refrigerant from a system and storing it in an airtight container.
Refrigerant pump down

The specification of automatic refrigerant pump down can further limit potential losses and damage to the environment and have subsequent economic benefits to the building owner. Under the United Kingdom Environmental Protection Act 1990 unwanted refrigerant and refrigerating system oil are classified as either controlled or hazardous waste. Not only is it an offence to discharge them to the environment, but there are procedures regarding transport, storage, transfer of ownership and ultimate disposal. Article 16 of EC Regulation 2037/2000 specifies that used CFCs and HCFCs must be recovered for destruction or recycling or redamation.

Robust and tested refrigerant leak detection system

This is normally defined as that included on the Enhanced Capital Allowance (ECA) Energy Technology Product List (213) (or an equivalent list). Where the system does not fall within the scope of the ECA energy technology product list or an equivalent list, the design team must demonstrate to the assessor that the system specified meets the principles of the scheme as far as is applicable.

Small-scale white goods

These should be defined as domestic scale white goods and would also include small individual display cabinets, for example drinks cabinets in small retail shops.

Systems using refrigerants

The criteria of this issue apply to all building services installed in the building, regardless of the systems refrigerant charge (kg). Services including, but are not limited to:

- Comfort cooling or space heating (including assessment of refrigerants in heat pumps)
- Cold storage, including commercial food and drink display cabinets but excluding small-scale white goods
- Process-based cooling loads, e.g. servers and IT equipment.

Global warming potential (GWP)

GWP is defined as the potential for global warming that a chemical has relative to 1 unit of carbon dioxide, the primary greenhouse gas. In determining the GWP of the refrigerant, the Intergovernmental Panel on Climate Change methodology using a 100-year integrated time horizon should be applied.

Hermetically sealed systems

Hermetically sealed plant (as defined in the F Gas regulations) can be awarded the Leak Detection credit by default. The Regulations definition of hermetically sealed plant only allows systems to have a tested leakage rate of less than 3 grams per year. This results in the risk of a large refrigerant leak due to system failure being minimised.

Refrigerant

There are three main types of refrigerants:

1. Hydrogenated fluorocarbon refrigerants (HFCs) are made up of hydrogen, fluorine and carbon. These do not use a chlorine atom (which is used in most refrigerants). Due to this 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. The United Nations Environment Programme (UNEP) hosts a HCFC help centre which contains information about the management and phase out of HCFCs and alternatives to HCFCs in the refrigeration and air-conditioning sector www.uneptie.org.

Additional information

Automatic isolation and containment of refrigerant
An example of a system which would meet criterion 6.b could be one which initiates an automated shut down and pump down of the refrigerant into a separate storage tank.

Limiting loss of refrigerant in the event of a leak
BREEAM has not set specific requirements or methods regarding the most appropriate way of limiting refrigerant loss. This will be different depending on the system type. Example methods are pump down, isolation or system shut-down, etc.

Common refrigerants

Table 75 List of some common refrigerant types with low GWP

<table>
<thead>
<tr>
<th>R-Number</th>
<th>Chemical name</th>
<th>GWP 100-yr</th>
</tr>
</thead>
<tbody>
<tr>
<td>R-30</td>
<td>Dichloromethane</td>
<td>9</td>
</tr>
<tr>
<td>R-170</td>
<td>Ethane</td>
<td>3</td>
</tr>
<tr>
<td>R-290</td>
<td>Propane</td>
<td>3</td>
</tr>
<tr>
<td>R-600</td>
<td>Butane</td>
<td>3</td>
</tr>
<tr>
<td>R-600a</td>
<td>Isobutane</td>
<td>3</td>
</tr>
<tr>
<td>R-702</td>
<td>Hydrogen</td>
<td>5.8</td>
</tr>
<tr>
<td>R-717</td>
<td>Ammonia</td>
<td>0</td>
</tr>
<tr>
<td>R-718</td>
<td>Water</td>
<td>0.2–0.2</td>
</tr>
<tr>
<td>R-729</td>
<td>Air (nitrogen, oxygen, argon)</td>
<td>1</td>
</tr>
<tr>
<td>R-744</td>
<td>Carbon dioxide</td>
<td>1</td>
</tr>
<tr>
<td>R1150</td>
<td>Ethylene</td>
<td>3</td>
</tr>
<tr>
<td>R-1234yf</td>
<td>2,3,3,3-Tetrafluoropropene</td>
<td>4</td>
</tr>
<tr>
<td>R-1270</td>
<td>Propylene</td>
<td>3</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>R-Number</th>
<th>Chemical name</th>
<th>GWP 100-yr</th>
</tr>
</thead>
</table>

The formula used to calculate the DELC 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 and indirect emissions produced through the energy consumed in operating the equipment. This BREEAM issue is concerned with direct emissions and the BREEAM energy section is concerned with indirect emissions.

Refer to BS EN 378-1\(^{(214)}\) and the BRA’s Guideline methods of calculating TEWI for further details. The BRA publication also includes sectorial release factors for new systems designed to best practice standards.

**REAL Zero**

The refrigeration and air-conditioning sector supported by the Carbon Trust is working across all sectors of business and industry, to help achieve significant reductions in carbon emissions due to refrigerant leakage from installed systems. The Institute of Refrigeration led initiative, Real Zero, is building a clearer understanding of where and why leakage occurs as well as how to prevent it.

For further information including guidance notes, calculators, tools and case study information, visit: [www.ior.org.uk](http://www.ior.org.uk) and [www.realskillseurope.eu](http://www.realskillseurope.eu).
Pol 02 Local air quality

Aim

To contribute to a reduction in local air pollution through the use of low emission combustion appliances in the building.

Value

- Improved air quality for building occupants, visitors and neighbours leading to better health and wellbeing outcomes.
- Increased staff satisfaction and productivity.
- Enhanced acceptability of a building locally especially in areas with compromised air quality that have their emissions even more tightly controlled.
Context

Poor air quality has a detrimental effect on humans, fauna and flora. Gases such as Nitrous Oxides (NO₂) can react with other gases and environmental factors including sunlight to create substances that have a major impact on health and wellbeing. The resulting substances can be highly detrimental to human health. They can be carcinogenic, affect respiratory function (including asthma and other bronchial complaints), have a sensitising effect for allergy sufferers and increase instances of heart disease. Legislation covering the UK sets maximum acceptable limits for measured air pollutants. Under this issue BREEAM seeks to limit emissions from developments in use that affect local air quality.

Assessment scope

<table>
<thead>
<tr>
<th></th>
<th>Fully fitted</th>
<th>Simple building</th>
<th>Shell and core</th>
<th>Shell only</th>
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<td>Applicable Assessment criteria</td>
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<td>Assessment type specific notes</td>
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<td>None</td>
<td>None</td>
<td>None</td>
</tr>
</tbody>
</table>

Assessment type specific

None

Building type specific

None
Pol 02 Local air quality

Assessment criteria

Up to two credits

1. All installed combustion plant that provide space heating and domestic hot water and for which minimum emission levels have been set under European Directive 2009/125/EC must meet the following emission levels. All measurements must be provided by manufacturers, following the labelling requirements of the directive. To award either one or two credits, all systems must be compliant for all emission levels, including the second table if relevant to the fuel. Regardless of the pollutants responsible for the creation of an Air Quality Management Area (AQMA), if the development is in an AQMA all emissions must meet the lower levels for that technology and fuel for the credits to be awarded.

Table 76 Maximum NO\textsubscript{x} emission levels by appliance type, fuel and AQMA

<table>
<thead>
<tr>
<th>Appliance type and unit</th>
<th>Fuel</th>
<th>InAQMA NO\textsubscript{x} (1 credit)</th>
<th>NO\textsubscript{x} (2 credits)</th>
<th>Outside AQMA NO\textsubscript{x} (1 credit)</th>
<th>NO\textsubscript{x} (2 credits)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boiler (mg/kWh)</td>
<td>Gas</td>
<td>27</td>
<td>24</td>
<td>41</td>
<td>27</td>
</tr>
<tr>
<td>Boiler (mg/kWh)</td>
<td>Oil</td>
<td>56</td>
<td>50</td>
<td>63</td>
<td>56</td>
</tr>
<tr>
<td>Boiler (mg/m\textsuperscript{3})</td>
<td>Biomass</td>
<td>56</td>
<td>50</td>
<td>165</td>
<td>131</td>
</tr>
<tr>
<td>Boiler (mg/m\textsuperscript{3})</td>
<td>Solid fuel</td>
<td>56</td>
<td>50</td>
<td>165</td>
<td>131</td>
</tr>
<tr>
<td>Cogeneration or heat pumps using external combustion (mg/kWh)</td>
<td>Gas</td>
<td>34</td>
<td>30</td>
<td>52</td>
<td>34</td>
</tr>
<tr>
<td>Cogeneration or heat pumps using external combustion (mg/kWh)</td>
<td>Oil</td>
<td>56</td>
<td>50</td>
<td>108</td>
<td>96</td>
</tr>
<tr>
<td>Cogeneration - using internal combustion engine</td>
<td>Gas</td>
<td>56</td>
<td>50</td>
<td>179</td>
<td>119</td>
</tr>
<tr>
<td>Cogeneration - using internal combustion engine (mg/kWh)</td>
<td>Oil</td>
<td>56</td>
<td>50</td>
<td>379</td>
<td>339</td>
</tr>
<tr>
<td>Local Space Heaters (mg/kWh)</td>
<td>Gas and Oil</td>
<td>56</td>
<td>50</td>
<td>103</td>
<td>76</td>
</tr>
<tr>
<td>Open and closed fronted local space heaters (mg/m\textsuperscript{3})</td>
<td>Biomass, Solid fuel and Wood pellets</td>
<td>56</td>
<td>50</td>
<td>165</td>
<td>131</td>
</tr>
</tbody>
</table>

Table 77 Maximum particulate matter and volatile organic compound emissions for appliances using biomass, solid fuel and wood pellets

<table>
<thead>
<tr>
<th>Appliance type and unit</th>
<th>Fuel</th>
<th>PM 1 Credit</th>
<th>PM 2 Credits</th>
<th>VOC 1 Credit</th>
<th>VOC 2 Credits</th>
<th>PM 1 Credit</th>
<th>PM 2 Credits</th>
<th>VOC 1 Credit</th>
<th>VOC 2 Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boiler (mg/m\textsuperscript{3})</td>
<td>Biomass</td>
<td>6</td>
<td>7</td>
<td>4</td>
<td>5</td>
<td>27</td>
<td>13</td>
<td>14</td>
<td>7</td>
</tr>
<tr>
<td>Boiler (mg/m\textsuperscript{3})</td>
<td>Solid Fuel</td>
<td>6</td>
<td>7</td>
<td>4</td>
<td>5</td>
<td>29</td>
<td>13</td>
<td>19</td>
<td>7</td>
</tr>
<tr>
<td>Open faced local space heater (mg/m\textsuperscript{3})</td>
<td>Biomass and Solid Fuel</td>
<td>6</td>
<td>20</td>
<td>4</td>
<td>10</td>
<td>39</td>
<td>50</td>
<td>29</td>
<td>50</td>
</tr>
</tbody>
</table>
### Compliance notes

Compliance notes are located in Appendix G – Notes for compliance on page 18 for the consultation. These compliance notes will be available through the knowledge base when the scheme goes live.

### Methodology

#### Awarding credits

All three emission levels (if applicable to the fuel) must be met. Where a development is in an AQMA, regardless of the emissions which have resulted in the AQMA, all relevant emission levels in the tables need to be met to award credits.

#### Units of measure for emissions

The Ecodesign Directive comes into force in September 2018. This sets performance requirements for combustion powered heating systems and requires manufacturers to publish the NO\textsubscript{x} particulate matter and VOC emission levels of their products. BREEAM uses the same units of measure as the Directive, which are: NO\textsubscript{x} measured in mg/kWh fuel input (Gross Calorific Value (GCV)) for gas or oil appliances Particulate matter and VOCs for all solid fuel or biomass boilers measured in mg/mm\textsuperscript{3} 10% O\textsubscript{2} dry basis Particulate matter and VOCs for all solid fuel or biomass local heaters measured in mg/m\textsuperscript{3} 13% O\textsubscript{2} dry basis.

#### New build extensions to existing building

If the heating and hot water demand for the new extension is being met by an existing system, then the NO\textsubscript{x} emission levels for the existing system must be assessed against the criteria of this issue.

#### Grid electricity

Where grid electricity is used to supply building systems emissions should be assumed to be zero for the purpose of BREEAM. The reason for this is based on the aim of the issue, which is to improve local air quality.

#### Heat recovery

Heat recovery can be considered as having zero NO\textsubscript{x} emissions for the purpose of this issue.

#### Open flue

No credits may be awarded for open flue heating or hot water systems.
Buildings not heated by combustion appliances
Buildings which do not use combustion appliances as a source of space heating or hot water (for example those using only grid electricity) will have zero emissions affecting local air quality. This means the aim of the issue has been met, so the two Pol 02 credits can be awarded by default.

Evidence

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Interim design stage</th>
<th>Final post-construction stage</th>
</tr>
</thead>
<tbody>
<tr>
<td>All</td>
<td>One or more of the appropriate evidence types listed in The BREEAM evidential requirements on page 38 can be used to demonstrate compliance with these criteria.</td>
<td></td>
</tr>
</tbody>
</table>

Definitions

Approved building energy calculation software
Software approved for the purpose of demonstrating compliance with the energy efficiency and carbon emission requirements of the building regulations (and in turn compliance with the EPBD recast 2012). The definition includes the SBEM and its interface iSBEM, as well as third-party software approved by the relevant government department. A list of approved software for non-domestic buildings for Wales is provided here: www.ncm.bre.co.uk
A list of approved software for non-domestic buildings for Scotland is provided here: www.scotland.gov.uk
A list of approved software for non-domestic buildings for Northern Ireland is provided here: www.ncm.bre.co.uk/
A list of approved software for non-domestic buildings for England is provided here: www.ncm.bre.co.uk
A list of approved software for non-domestic buildings is as follows:
1. Scotland: www.gov.scot
2. Wales, Northern Ireland and England: www.ncm.bre.co.uk/

Approved building energy calculation software will provide the data required for calculating the EPBD recast 2012 and BREEAM Ene 01 credits. Please note that for dwellings (where relevant to the assessment of multi-residential buildings), the government’s SAP may be used. The current version is SAP 2012 version 9.92 (October 2013).

$NO_x$ emissions
$NO_x$ emissions are pollutant gases produced by the combustion of fossil fuels. $NO_x$ reacts with heat and sunlight to produce ozone that can cause serious respiratory problems. It also reacts with water to produce acid rain which has a detrimental effect on ecosystems.

Particulate matter emissions
Particulate matter (PM) is made up of microscopic solid and liquid particles suspended in air. They are a form of air pollution and included in the assessment of Pol 02 because of their wide ranging effects especially on humans (for example they are designated as a Group 1 carcinogen), climate and plants. They range in size, but local monitoring for AQMAs report on those which are less than 10 micrometres.
Volatile organic compounds

Volatile organic compounds (VOC) are any liquid or solid that evaporates spontaneously at the prevailing temperature and pressure of the atmosphere with which it is in contact. Some VOCs can affect human health directly, including being cancer causing and affecting the respiratory tract. They can also react with ozone to produce other products which can cause serious respiratory problems. VOCs emissions are assessed for their impact on internal air quality in issue Hea 01 Visual comfort on page lxxxix. The impact of VOC emissions from combustion on local air quality is assessed in this issue.

Additional information

Air quality management areas (AQMA)

Local authorities and boroughs monitor air quality (including nitrogen oxides and dioxide, particulate matter and VOCs) comparing it to levels set by the Department of Food and Rural Affairs (Defra). Where any measured pollutants breach the levels, the area is designated as an AQMA.

The BREEAM requirements are set against AQMAs because these areas have fallen below an acceptable standard. Hence, air quality is of greater importance in these areas, so new buildings and assets are required to perform better to achieve credits.

See www.uk-air.defra.gov.uk.

Ecodesign Directive

The EU’s Ecodesign Directive sets a framework for mandatory requirements for energy-using products. A number of separate commission regulations documents specify minimum levels for various emissions for different technologies. Where minimum emission levels have been set, the measured emission levels achieved must be included on the product label. These documents define both minimum and BAT (best available technology) emission levels for relevant emissions and BREEAM has used these emission levels as a basis for setting the benchmarks in Table 76 on page 393 and Table 77 on page 393. Regardless of the implementation date of the regulation covering the appliance, the relevant BREEAM benchmarks must be achieved to award credits.

The relevant EU Commission Regulation documents are listed below together with the relevant implementation dates:


Market research shows that the benchmarks are achievable but in some cases is challenging and in AQM areas only technologies and fuel types with lower emission levels are likely to achieve any credits. This has been done to incentivise the market to improve the performance of products.
Pol 03 Flood and surface water management

Aim

To avoid, reduce and delay the discharge of rainfall to public sewers and watercourses, thereby minimising the risk and impact of localised flooding on and off-site, watercourse pollution and other environmental damage.

Value

- Incentivise site selection and development design that minimises the potential for flooding on and off site.
- Limit the impact of development on off-site water management infrastructure, including the potential future increase in rainwater from climate change.
- Enhance the resilience of local drainage and flood prevention systems.
- Minimising the release of waterborne pollutants off-site.

Context

In the UK around 0.5 million homes, offices, factories and warehouses are considered to be at a significant risk of flooding, i.e. they have a greater than one in 75 chance per year of being flooded. Apart from the initial effects of being flooded, i.e. access and use of the building, once flood water is removed significant resources (man hours, time and cost) are usually required to clean, refit and re-open buildings for use.
This has major impacts on business continuity that can be costly and time consuming to manage. With due consideration at an early stage the location, design and specification of the development (including the building, curtilage and wider site) the risk of flooding and impact if it is flooded can be managed.

### Assessment scope

<table>
<thead>
<tr>
<th></th>
<th>Fully fitted</th>
<th>Simple building</th>
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<th>Shell only</th>
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<td>1–22</td>
<td>1–22</td>
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<td>Assessment type specific notes</td>
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<td>None</td>
<td>None</td>
</tr>
</tbody>
</table>

**Assessment type specific**

None

**Building type specific**

None
Pol 03 Flood and surface water management

Assessment criteria

Up to two credits - Flood resilience

Prerequisite
1 An appropriate consultant is appointed to carry out, demonstrate and confirm the development’s compliance with all criteria.

Two credits - Low flood risk
2 Where a site-specific flood risk assessment (FRA) confirms the development is situated in a flood zone that is defined as having a low annual probability of flooding (in accordance with current best practice national planning guidance (refer to Table 78 on page 410). The FRA must take all current and future sources of flooding into consideration (see Sources of flooding on page 402).

One credit - Medium or high flood risk
3 Where a site-specific FRA confirms the development is situated in a flood zone that is defined as having a medium or high annual probability of flooding and is not in a functional floodplain. This must be in accordance with current best practice national planning guidance (refer to Table 78 on page 410). The FRA must take all current and future sources of flooding into consideration (see Sources of flooding on page 402). For smaller sites refer to Pol 03 Flood and surface water management above, which overrides criterion 2 above.
4 To increase the resilience and resistance of the development to flooding, one of the following must be achieved:
   4.a. The ground level of the building and access to both the building and the site, are designed (or zoned) so they are at least 600mm above the design flood level of the flood zone in which the assessed development is located (see Pol 03 Flood and surface water management above).
   4.b. The final design of the building and the wider site reflects the recommendations made by an appropriate consultant in accordance with the hierarchy approach outlined in section 5 of BS8533:2011 (216).

Two credits - Surface water run-off

Prerequisite for surface water run-off credits
5 Surface water run-off design solutions must be bespoke, taking account of the specific site requirements and natural or man-made environment of and surrounding the site. The priority levels detailed in the Methodology must be followed, with justification given by the appropriate consultant where water is allowed to leave the site.

One credit
6 Where drainage measures are specified to ensure that the peak rate of run-off from the site to the watercourses (natural or municipal), a 30% improvement must be shown for the developed site compared to the pre-developed site. This should comply at the 1-year and 100-year return period events.
7 Relevant maintenance agreements for the ownership, long term operation and maintenance of all specified Sustainable Drainage Systems (SuDS) are in place.

8 Calculations include an allowance for climate change; this should be made in accordance with current best practice planning guidance (see definitions).

One credit

9 Where flooding of property will not occur in the event of local drainage system failure (caused either by extreme rainfall or a lack of maintenance); AND

EITHER

10 Drainage design measures are specified to ensure that the post development run-off volume, over the development lifetime, is no greater than it would have been prior to the assessed site’s development. This must be for the 100-year 6-hour event, including an allowance for climate change (see criterion 14).

11 Any additional predicted volume of run-off for this event is prevented from leaving the site by using infiltration or other SuDS techniques.

OR (only where criteria 10 and 11 for this credit cannot be achieved):

12 Justification from the appropriate consultant indicating why the above criteria cannot be achieved, i.e. where infiltration or other SuDS techniques are not technically viable options.

13 Drainage design measures are specified to ensure that the post development peak rate of run-off is reduced to the limiting discharge. The limiting discharge is defined as the highest flow rate from the following options:

13.a The pre-development one-year peak flow rate

13.b The mean annual flow rate (Qbar)

13.c 2L/s/ha.

For the one-year peak flow rate, the one-year return period event criterion applies.

14 Relevant maintenance agreements for the ownership, long term operation and maintenance of all specified SuDS are in place.

15 For either option, above calculations must include an allowance for climate change; this should be made in accordance with current best practice planning guidance.

One credit - Minimising watercourse pollution

16 There is no discharge from the developed site for rainfall up to 5mm (confirmed by the appropriate consultant).

17 In areas with a low risk source of watercourse pollution, an appropriate level of pollution prevention treatment is provided, using appropriate SuDS techniques.

18 Where there is a high risk of contamination or spillage of substances such as petrol and oil, separators (or an equivalent system) are installed in surface water drainage systems.

19 Where the building has chemical or liquid gas storage areas, a means of containment is fitted to the site drainage system (i.e. shut-off valves) to prevent the escape of chemicals to natural watercourses (in the event of a spillage or bunding failure).

20 All water pollution prevention systems have been designed and installed in accordance with the recommendations of documents such as the National Planning Policy Framework(217) or where applicable the SuDS manual(218). They must be bespoke solutions taking account of the specific site requirements and natural or man-made environment of and surrounding the site. For areas where vehicle washing will be taking place, pollution prevention systems must be in accordance with Pollution Prevention Guidelines 13 (219).

21 A comprehensive and up to date drainage plan of the site will be made available for the building or site occupiers.
22 Relevant maintenance agreements for the ownership, long term operation and maintenance of all specified SuDS must be in place.

23 Where present, all external storage and delivery areas designed and detailed in accordance with the current best practice planning guidance (see Pol03 Flood and surface water management on page 399).

Two credits - Simple buildings - Surface water run-off

For ‘simple buildings’, the criteria below should be applied in place of the surface water run-off criteria above.

24 Either of the following criteria is met:

24.a There is a decrease in the impermeable area by 50% or more, from the pre-existing impermeable hard surfaces.

24.b Where all run-off from the roof for rainfall depths up to 5mm from all new and existing parts of the building have been managed on-site using source control methods.

OR

One credit - Simple buildings - Surface water run-off

25 Either of the following criteria is met:

25.a There is no increase in the impermeable surfaces as a result of the new construction; OR

25.b(1) There is an increase in the impermeable surface as a result of the new construction then the following must be met:

25.b(1). Hard standing areas—where there is an extension or increase in the hardstanding areas and hence an increase in the total impermeable area as a result of the new construction, the hardstanding area must be permeable or be provided with on-site SuDS to allow full infiltration of the additional volume, to achieve the same end result. The permeable hardstanding must include all pavements and public rights of way, car parks, driveways and non-adoptable roads, but can exclude small garden paths which will drain onto a naturally permeable surface.

25.b(1). Building (new-build or extension)—where there is an increase in building footprint, extending onto any previously permeable surfaces, the additional run-off caused by the area of the new build or extension must be managed on site using an appropriate SuDS technique for rainfall depths up to 5 mm.

Compliance notes

Compliance notes are located in Appendix G – Notes for compliance on page 18 for the consultation. These compliance notes will be available through the knowledge base when the scheme goes live.

Methodology

Applicable assessment criteria

None of the credits can be awarded where the assessed development has proceeded against the recommendation of the statutory body on the basis that the flooding implications are too great. This includes a recommendation given by the statutory body even where such a recommendation cannot or is not statutorily enforced. Where the local authority (or other statutory body) has set more rigorous criteria than those above these must be met in order to achieve the relevant credits.
Contaminated sites
Drainage designs for sites must take into account legislation relating to contaminated sites, however in many circumstances, even on contaminated sites, there may be opportunities for the installation of some SuDS techniques.

Sources of flooding
The FRA must detail the risk of flooding from the following sources:
1. Fluvial (rivers)
2. Tidal
3. Surface water: sheet run-off from adjacent land (urban or rural)
4. Groundwater: most common in low-lying areas underlain by permeable rock (aquifers)
5. Sewers: combined, foul or surface water sewers
6. Reservoirs, canals and other artificial sources.

Pol03 Flood and surface water management on page 399 provides more detail on the above sources of flooding.

The content of the FRA should be based on historic trends, but should also account for predicted changes to the climate which may impact on the flood risk to the site in future.

600mm threshold
It is accepted that, for buildings located in medium and high risk flood zones, areas of the car park and site access may be allowed to flood and therefore fall below the 600mm threshold. In such cases the credit is still achievable provided safe access to the site, and the ground floor of the building can be maintained (i.e. they are 600mm above the design flood level) to ensure the building and site do not become an ‘island’ in the event of a flood. Where the development has been permitted and the ground levels of the topography or infrastructure immediately adjacent to the site fall below the 600mm threshold, the credit can still be awarded. This is provided there are no other practical solutions for access to the site above this level and the assessed building, and access to it, meet the assessment criteria. As much of the external site area as possible (or as required by an appropriate statutory body) should be designed at or above the threshold. For buildings located in medium or high flood risk zones, any areas used to store sensitive, historical, hazardous, valuable and perishable materials, e.g. radioactive materials, microbiological facilities, server rooms, libraries, etc., must be located above the 600mm threshold.

Level of detail required in the FRA for smaller sites
For smaller sites, e.g. less than 1 ha (10,000 m²), the level of detail required in an acceptable FRA will depend on the size of the site and the arrangement of buildings on that site. For a small site with a relatively simple arrangement of buildings this might consist of a brief report. For larger sites with a higher density of buildings a more detailed assessment would be appropriate.

For small simple sites (2000 m² and less), an acceptable FRA could be a brief report carried out by the contractor’s engineer confirming the risk of flooding from all sources of flooding, including information obtained from the Environment Agency, water company or sewerage undertaker, other relevant statutory authorities, site investigation and local knowledge.

Sites with multiple buildings
Where the assessed building is part of a larger development of buildings, there are a number of options for assessment of the surface water run-off credits:

1. The individual building and its associated hardstanding areas can be assessed independently where the run-off is being dealt with on a building-by-building basis (i.e. each building has its own dedicated sub-catchment that serves only that building).
2. When assessing the run-off from a number of buildings (including domestic and non-domestic buildings) the assessment must take into account the drainage from the local sub-catchment serving all those dwellings or buildings. Note that proportioning cannot be used to calculate the percentage of run-off discharging into the local sub-catchment resulting from just the assessed building.

3. The whole development can be assessed for compliance.

Whichever approach is taken to demonstrate compliance, it must be consistent when completing both the rate of run-off and volume of run-off calculations.

**No change in impermeable area**

Where the man-made impermeable area draining to the watercourse (natural or municipal) has decreased or remains unchanged post development, the peak and volume rate of run-off requirements for the surface water run-off credits will be met by default. Flow rate calculations will not need to be provided. Instead, drawings clearly showing the impermeable areas of the site draining to the watercourse should be provided for the pre- and post development scenarios. Figures must also be given (ideally on the drawings) to show a comparison between the areas of drained impermeable surfaces pre- and post development. In this instance a flood risk assessment must be carried out and any opportunities identified to reduce surface water run-off are implemented.

**Limiting flow-rate discharge**

For the surface water run-off credits, where the limiting discharge flow rate would require a flow rate of less than 5L/s at a discharge point, a flow rate of up to 5L/s may be used where required to reduce the risk of blockage.

**Areas that are a source of pollution**

For the purpose of assessing the watercourse pollution credit, an area that presents a risk of watercourse pollution includes vehicle manoeuvring areas, car parks, waste disposal facilities, delivery and storage facilities or plant areas.

**Suitable level of treatment**

In all cases the appropriate consultant should use their professional judgment to determine the most appropriate strategy for minimising watercourse pollution.

**Roof plant**

Roof-top plant space must be considered where there is a risk from polluting substances such as petrol or oil. Refrigerants are not assessed under the pollution aspect of this issue, as the main risk of pollution is to air and not the watercourse.

**Calculating peak rate of run-off**

Key publications that should be referred to for guidance on calculating the peak rate of run-off include:

2. Preliminary rainfall run-off management for developments (221).
3. National planning policy guidance or statement for the specific country.

**Greenfield sites of less than 50 ha**


**Greenfield sites of 50 ha to 200 ha**

The calculation of greenfield run-off rates must be in accordance with IH Report 124. Flood Estimation Handbook can be used for these sites as an alternative, where there is a preference to do so, but only if the catchment is considered to be suitable for its application.
Greenfield sites of more than 200 ha
The calculation of greenfield run-off rates must be in accordance with the Flood Estimation Handbook. Where the Flood Estimation Handbook is not considered appropriate for the development, IH Report 124 can be used.

Brownfield sites
The calculation of brownfield run-off rates should be as follows:

- If the existing drainage is known then it should be modelled using best practice simulation modelling, to determine the one-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.

Surface water run-off management
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 (i.e. so that the volume of water that leaves the site is limited as far as practicable).

- Priority Level 1 Water is collected for use in the development (e.g. rainwater harvesting)
- Priority Level 2 Water is infiltrated into the ground
- Priority Level 3 Water is discharged to surface water body
- Priority Level 4 Water is discharged to the drainage system
- Priority Level 5 Water is discharged to a combined sewer

Limiting discharge rate
The limiting discharge for each discharge point should be calculated as the flow rates from the pre-developed site. 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 Relevant definitions in the Pol03 Flood and surface water management on page 399 section). Where this calculation results in a peak flow rate of less than 5L/s, the limiting discharge rate may be increased up to a level of no more than 5L/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 4L/s and 7L/s respectively, then the limiting discharges would be 5L/s and 7L/s. Similarly, if it was calculated to be 2L/s and 4L/s, then a maximum of 5L/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. In such cases, the limiting discharge flow rate may be increased to a level no more than 5L/s at each discharge point. The assessor should seek evidence that the number of discharge points is necessary due to topography or infrastructure limitations. 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.

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 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 floods flows and temporary storage of flood water on the surface must not be so frequent as to unreasonably inconvenience residents and other users.
Designing for exceedance guidance
CIRIA publication C635 (2006) Designing for exceedance in urban drainage—good practice (224) should be referred to for guidance.

Evidence

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Interim design stage</th>
<th>Final post-construction stage</th>
</tr>
</thead>
<tbody>
<tr>
<td>All</td>
<td>One or more of the appropriate evidence types listed in The BREEAM evidential requirements on page 38 can be used to demonstrate compliance with these criteria.</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Calculation results for the pre- and post-development peak rate of run-off</td>
<td>Refer to generic evidence requirement above</td>
</tr>
<tr>
<td>9</td>
<td>Information showing the proposed drainage solution, system failure flood flow routes, potential flood ponding levels and ground floor levels</td>
<td>As per interim design stage</td>
</tr>
<tr>
<td>10–13</td>
<td>Calculation results for the pre- and post-development volume of run-off</td>
<td>Refer to generic evidence requirement above</td>
</tr>
<tr>
<td>13</td>
<td>Calculation results for the limiting discharge</td>
<td>As per interim design stage</td>
</tr>
<tr>
<td>7, 14, 22</td>
<td>No ‘specific’ evidence applies at Design Stage</td>
<td>Relevant maintenance agreements for the ownership, long term operation and maintenance of all specified SuDS.</td>
</tr>
<tr>
<td>24.b, 25.b.ii</td>
<td>Calculation of the 5mm rainfall event from the relevant areas</td>
<td>Refer to generic evidence requirement above</td>
</tr>
</tbody>
</table>

Definitions

Adoptable highways
For the purposes of BREEAM, an ‘adoptable’ highway is a highway that is the responsibility of the highways authority in terms of installation and maintenance of surface water drainage which only carries run-off from the highway itself. This means that to fall under the definition of an ‘adoptable highway’ the drainage network must not be directly connected to any other upstream drainage network (e.g. from a private development) and only handle run-off from the adoptable highway. Where drainage within the highway will carry run-off from both the highway and housing, it is not regarded as an ‘adoptable’ highway. In this instance the drainage design must take account of the highway run-off.

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.
Appropriate statutory body
This refers to either the appropriate national body (i.e. The Environment Agency in England and Wales, the Rivers Agency in Northern Ireland and the Scottish Environment Protection Agency in Scotland) or the relevant local authority or internal drainage board.

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

Control devices
Any drainage structure or unit designed to control the run-off of storm water. Examples of SuDS control devices are check dams within swales and basins, and combined weir or orifice controls for ponds. Examples of traditional control devices are throttles constructed with pipes and vortex controls. The control devices must be capable of regular inspection and maintenance, and the system should be failsafe so that upstream flooding does not result from blockage or other malfunction. For guidance on control devices, refer to The SuDS manual (CIRIA C697, 2007) and other best practice guidelines.

Current best practice national planning guidance
These are current at the time of publication: Planning Practice Guidance – Flood Risk and Coastal Changes – England; Planning Policy Statement 15 – Northern Ireland; Scottish Planning Policy 7 – Scotland; Technical Advice Note – Wales.

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

Design flood event
An historic or notional flood event of a given annual flood probability, against which the suitability of a proposed development is assessed and mitigation measures, if any, are designed.

Design storm event
Historic or notional weather conditions of a given annual probability, against which the suitability of a proposed development is assessed and mitigation measures, if any, are designed.

Discharge point
The discharge points is the point at which the run-off from the site leaves the site boundary and enters a watercourse.

Flood defences
Flood defences do not completely remove the risk of flooding, but they do reduce it. Building in areas where flood defences are present (and appropriately designed to withstand a certain magnitude of flooding) is therefore preferable to those built in medium or high risk areas without defences. However, for the purpose of this issue, it is still preferable to build in areas of low risk than encourage development of new flood defences in areas with a higher risk of flooding purely for the sake of new development.

Flood event
A flooding incident characterised by its peak level or flow, or by its level or flow hydrograph.
Flood probability
The estimated probability of a flood of given magnitude occurring or being exceeded in any specified time period. For example, the 100-year flood has a 1% chance of occurring in any given year.

Flood risk
The combination of the flood probability and the magnitude of the potential consequences of the flood event.

Flood risk assessment
A study to assess the risk of a site flooding, and to assess the impact that any changes or development on the site will have on flood risk to the site and elsewhere. A Flood Risk Assessment (FRA) should be prepared according to relevant planning policy and technical guidance documents. The FRA must account for future climate change and detail any necessary adaptation measures where or if required. Where more than five years have passed since the FRA was carried out, evidence would be required to demonstrate that the basis of the FRA has not changed in that time.

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

Flood zones
Flood zones are defined in the relevant planning, policy and technical guidance documents for each country in the UK: Planning Practice Guidance - Flood Risk and Coastal Changes (England), TAN15 (Wales), SPP7 (Scotland), PPS15 (Northern Ireland). Please note, PPS15 does not categorise flood risk zones and there are no similar publicly available flood maps covering Northern Ireland. Assessments in Northern Ireland will therefore need to rely on-site-specific flood risk assessments, or other relevant data or surveys, to determine the extent of flood risk for a specific development, and use the same definitions as those outlined for England (Table 78 on page 410). The Northern Ireland Department of Environment or Rivers Agency may offer further advice or recommendations in this respect www.doeni.gov.uk and www.dardni.gov.uk.

While the definitions of flood zones and probabilities of flooding are generally the same throughout the UK, there are some differences. The definitions are outlined in Table 78 on page 410.

Greenfield
A site which has either never been built on, or one which has remained undisturbed for five years or more.

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

Hard surfaces
These include roofs, car parks, access roads, pavements, delivery or 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, soakaways and so on.

Limiting discharge
The limiting discharge is based upon the calculated pre-development flow rate at a discharge point.
Level of pollution prevention treatment
When used in the context of one, two or three levels of treatment for surface water, the treatment level should be regarded as the number of SuDS components in series through which run-off passes from the originating surface on which rainfall fell to the site discharge point. Where a SuDS component has more than one treatment process, it might be considered to provide more than one level of treatment. In these circumstances advice should be sought from the BREEAM office.

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 credit, roofs and small car parks may be considered as low risk areas.

Peak run-off rate (referred to as Qp [m³/second])
This is the highest rate of flow from a defined catchment area assuming that rainfall is uniformly distributed over the drainage area, considering the entire drainage area as a single unit and estimation of flow at the most downstream point only.

Pre-development
The state of the site under assessment immediately prior to purchase of the site by the client or developer (or, where the client has owned or occupied the site for a number of years, its current state).

Qbar
An estimation of the mean annual flood flow rate from a catchment (see Report IH1 24 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.

Sewerage undertaker
This is a Body, typically a water company, with statutory responsibility for sewerage and sewerage disposal and also surface water from roofs and yards of premises.

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, but shallow structures providing infiltration in an extensive way (infiltration trenches and permeable paving) do not need oil separators.

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 and harvesting
   - 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.

**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 harvesting, 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 (CIRIA C753, 2015).

**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.

**Treatment**

Improving the quality of water by physical, chemical or biological means.

**Types of oil separator**

- **Class 1 Separators:** These are designed to achieve a concentration of less than 5 mg/l oil under standard test conditions. They should be used when the separator is required to remove very small oil droplets, such as those arising from car park run-off.

- **Class 2 Separators:** These are designed to achieve a concentration of less than 100 mg/l oil under standard test conditions. They are suitable for dealing with discharges where a lower quality requirement applies or for trapping large spillages. Both classes can be produced as ‘full retention’ or ‘bypass’ separators:

  - **Full retention separators:** These treat the flow that can be delivered by the drainage system, which is normally equivalent to the flow generated by a rainfall intensity of 50mm/hr.
**Bypass separators:** These fully treat all flows generated by rainfall rates of up to 5mm/hr. Flows above this rate are allowed to bypass the separator. These separators are used when it is an acceptable risk not to provide full treatment for high flows.

**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- and post development.

**Watercourses and sewers**

A term that includes rivers, streams, ditches, drains, culverts, dykes, sluices, sewers and passages through which water flows.

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**Additional information**

This section will be revised when the national standards for sustainable drainage and associated regulations come into force.

**Definition of flood zones by country**

<table>
<thead>
<tr>
<th>Definition</th>
<th>England</th>
<th>Wales</th>
<th>Scotland</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low annual probability of flooding</td>
<td>Zone 1 Less than 1 in 1000 chance of river and sea flooding (&lt;0.1%).</td>
<td>Zone A Considered to be at little or no risk. Zone B If site levels are greater than the flood levels used to define adjacent extreme flood outline.</td>
<td>Little or no risk area As defined for England.</td>
</tr>
<tr>
<td>Medium annual probability of flooding</td>
<td>Zone 2 Between 1 in 100 and 1 in 1000 chance of river flooding (1%–0.1%) and between a 1 in 200 and 1 in 1000 chance of sea flooding (0.5%–0.1%).</td>
<td>Zone B If site levels are not greater than the flood levels used to define adjacent extreme flood outline. Zone C Equal to or greater* than 0.1% (river, tidal or coastal flooding). * For the purposes of BREEAM assume upper probability of flooding no greater than that specified for England.</td>
<td>Low to medium risk area Watercourse, tidal or coastal flooding in the range 0.1%–0.5% (1:1000–1:200).</td>
</tr>
<tr>
<td>High annual probability of flooding</td>
<td>Zone 3a High Probability 1 in 100 or greater chance of river flooding (&gt;1%) and a 1 in 200 or greater chance of</td>
<td>Zone C1 and C2 * For the purposes of BREEAM assume the same lower and upper</td>
<td>Medium to high risk areas Annual probability of watercourse,</td>
</tr>
</tbody>
</table>
Sources of flooding and flood risk

1. Streams and rivers: Flooding that can take place from flows that are not contained within the channel due to high levels of rainfall in the catchment.
2. Coastal or estuarine: Flooding that can occur from the sea due to a particularly high tide or surge, or a combination of both.
3. Groundwater: Where the water table rises to such a height where flooding occurs. Most common in low-lying areas underlain by permeable rock (aquifers), usually due to extended periods of wet weather.
4. Sewers and highway drains: Combined, foul or surface water sewers and highway drains that are temporarily over-loaded due to excessive rainfall or due to blockage.
5. Surface water: The net rainfall falling on a surface (on or off the site) which acts as run-off which has not infiltrated into the ground or entered into a drainage system.
6. Infrastructure failure: Canals, reservoirs, industrial processes, burst water mains, blocked sewers or failed pumping stations.

SuDS - sustainable drainage systems

A sequence of management practices and control structures designed to drain surface water in a more sustainable fashion than some conventional techniques. Examples of SuDS devices include:

- Holding ponds
- Swales
- Reed beds
- Permeable paving - in areas where local geological and hydrological conditions allow this to function, e.g. block paved surfac on permeable sub-base over gravel bed to store the water and allow it to seep into the soil. For less permeable soils, the gravel layer might be deeper and the water taken to a soakaway although this is not an option in some areas
- Local or centralised soakaways either as full systems or as ‘overflow’ or ‘holding’ systems, in areas where local geological and hydrological conditions allow them to function
- Run-off from roofs collected as a part of a rainwater harvesting system
- Run-off from roofs directed to a local soakaway or other holding facility such as tanks, ponds, swales etc.
- Green roofs.

For more information refer to The SuDS Manual (CIRIA C753, 2015).

External storage and delivery areas guidance documents

**Wales and England**

For assessment in Wales and England, the recommendations of the Environment Agency’s publication Pollution Prevention Pays Guidance, 2013 (225) should be followed.

**Scotland and Northern Ireland**

<table>
<thead>
<tr>
<th>Definition</th>
<th>England</th>
<th>Wales</th>
<th>Scotland</th>
</tr>
</thead>
<tbody>
<tr>
<td>flooding from the sea (&gt;0.5%). Zone 3b The Functional Floodplain Land where water has to flow or be stored in times of flood.</td>
<td>probability of flooding as that specified for England.</td>
<td>tidal or coastal flooding: greater than 0.5% (1:200).</td>
<td></td>
</tr>
</tbody>
</table>

Northern Ireland PPS15 does not categorise flood risk zones and there are no similar publicly available flood maps covering Northern Ireland. Assessments in NI will therefore need to rely on site-specific flood risk assessments, or other relevant data or surveys, to determine the extent of flood risk for a specific development, and use the same definitions as those outlined for England.

The Northern Ireland Department of Environment or Rivers Agency may offer further advice or recommendations in this respect [www.doeni.gov.uk](http://www.doeni.gov.uk) and [www.riversagency.ni.gov.uk](http://www.riversagency.ni.gov.uk).

The above country-specific risk levels are based on flooding from rivers and the sea. Please refer to Sources of flooding on page 402 which confirms the list of sources of flooding that need to be taken account of when conducting a flood risk assessment for a particular site.
For assessment in Scotland and Northern Ireland, the 'Pollution Prevention Pays Guidelines' from the Environment Agency reference the following documents which are relevant:

- Introducing Pollution Prevention: PPG1
- Above ground oil storage tanks: PPG2
- The use and design of oil separators in surface water drainage systems: PPG3
- Working at demolition and construction sites: PPG6
- Vehicle washing and cleaning: PPG13
- Managing firewater and major spillages: PPG28
- Dewatering underground ducts and chambers: PPG20
- Incident response planning: PPG21
- Dealing with spills: PPG22
- Drums and intermediate bulk container: PPG26
- Underground storage tanks: PPG27.

**Contaminated sites**

Examples of contamination legislation that should be considered includes: the Water Resources Act 1991, the Environmental Protection Act 1990, the Groundwater Directive (2006/118/EC) and, more recently the Groundwater (England and Wales) Regulations 2009. Where the site risk assessment confirms that infiltration SuDS techniques are not appropriate, SuDS techniques that do not allow infiltration, such as swales lined with an impermeable membrane, can be used.

It may be the case that only some areas of the site are contaminated and therefore infiltration SuDS techniques can be used elsewhere on the site. There may also be a requirement to remediate the contaminated soils, creating opportunities for the use of infiltration SuDS post-remediation.
Pol 04 Reduction of night time light pollution

Aim

To ensure that external lighting is concentrated in the appropriate areas and that upward lighting is minimised, reducing unnecessary light pollution, energy consumption and nuisance to neighbouring properties.

Value

- Minimise nuisance to neighbouring properties due to lighting.
- Maintain an adequate level of safety and security lighting on the site.
- Reduce energy use by designing coverage and control systems that are appropriate for the development.

Context

The external lighting used by buildings can have a detrimental impact on the use and enjoyment of neighbouring properties and the mental and physical well-being of individuals in them. It also has a significant and often detrimental impact on local wildlife.
The design of lighting installations can reduce the impacts without limiting their functionality and there are a number of appropriate best practice standards for the design and control of such lighting installations that aim to minimise these detrimental impacts.

By limiting light pollution the impact and energy use of the building may be reduced making it more acceptable to local communities and reducing impacts on local wildlife.

Assessment scope

<table>
<thead>
<tr>
<th></th>
<th>Fully fitted</th>
<th>Simple building</th>
<th>Shell and core</th>
<th>Shell only</th>
</tr>
</thead>
<tbody>
<tr>
<td>Applicable assessment criteria</td>
<td>All</td>
<td>All</td>
<td>All</td>
<td>All</td>
</tr>
<tr>
<td>Assessment type specific notes</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>None</td>
</tr>
</tbody>
</table>

Assessment type specific

None

Building type specific

None
Pol 04 Reduction of night time light pollution

Assessment criteria

One credit
1. Where external lighting pollution has been eliminated through effective design that removes the need for external lighting without adversely affecting the safety and security of the site and its users.

OR alternatively, where the building does have external lighting, one credit can be awarded as follows:

2. The external lighting strategy has been designed in compliance with Table 2 (and its accompanying notes) of the Institute of Lighting Professionals (ILP) Guidance notes for the reduction of obtrusive light, 2011 (226). Buildings

3. All external lighting (except for safety and security lighting) can be automatically switched off between 23:00 and 07:00.

4. If safety or security lighting is provided and will be used between 23:00 and 07:00, this part of the lighting system complies with the lower levels of lighting recommended during these hours in Table 2 of the ILP guidance notes.

5. Illuminated advertisements, where specified, must be designed in compliance with ILP PLG05 The Brightness of Illuminated Advertisements (227).

Compliance notes
Compliance notes are located in Appendix G – Notes for compliance on page 18 for the consultation. These compliance notes will be available through the knowledge base when the scheme goes live.

Methodology

Scope of assessment
Where the assessment is of an individual building on an existing site then only those areas affected by the works, i.e. within the construction zone, need to be assessed. Where the assessment is of a building that forms part of an entire new development, the criteria apply site-wide.

Lighting for security purposes
Where light fittings are specified to comply with specific security standards and these conflict with the BREEAM criteria, they can be excluded from the assessment of this issue. In these circumstances the assessor must obtain evidence confirming the specific security standards and that they are applicable to the assessed development.
Illuminated advertisements
All types of illuminated advertisement must meet the criteria, both self-illuminated and those illuminated by reflection from other sources.

Evidence

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Interim design stage</th>
<th>Final post-construction stage</th>
</tr>
</thead>
<tbody>
<tr>
<td>All</td>
<td>One or more of the appropriate evidence types listed in <a href="#">The BREEAM evidential requirements on page 38</a> can be used to demonstrate compliance with these criteria.</td>
<td></td>
</tr>
</tbody>
</table>

Definitions

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

Additional information

The ILP Guidance notes for the Reduction of Obtrusive Light, 2011 are available free of charge from the ILP website [www.theilp.org.uk](http://www.theilp.org.uk).

Table 2 of the ILP guidance and its accompanying notes outlines four sets of recommendations:

1. Limits to the average upward light ratio of the luminaires, to restrict sky glow.
2. Limiting illuminance at the windows of nearby properties for which light trespass might be an issue.
3. Limiting the intensity of each light source in potentially obtrusive directions beyond the site boundaries.
4. Limiting the average luminance of the building, if it is floodlit.

In each case the limiting values depend on the location of the site of the building (for example rural, urban or city centre). A calculation of illuminance (2) or intensity (3) is not required if all luminaires are cut-off types and angled so that light in potentially obtrusive directions is blocked.
Pol 05 Reduction of noise pollution

Aim

To reduce the likelihood of noise arising from fixed installations on the new development affecting nearby noise-sensitive buildings.

Value

- Minimise nuisance noise to neighbours and local wildlife.

Context

Excessive noise can have a detrimental effect on the use and enjoyment of private property such as dwellings and business premises. It can also cause disruption for wildlife. Noise can have a major impact on the mental and physical wellbeing of individuals both within and neighbouring a building. Legislation is in place to control buildings...
and other noise-producing processes but these are typically enforced following complaints from neighbours and improvements required as a result can be costly to make.

It is important to consider the noise that will be produced by developments at an early stage, plan the development in a way that minimises them, and seek to design and specify the building and its services in a way that limits its impact.

### Assessment scope

<table>
<thead>
<tr>
<th></th>
<th>Fully fitted</th>
<th>Simple building</th>
<th>Shell and core</th>
<th>Shell only</th>
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</thead>
<tbody>
<tr>
<td>Applicable Assessment criteria</td>
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<td>Not applicable</td>
<td>All</td>
<td>Not applicable</td>
</tr>
<tr>
<td>Assessment type specific notes</td>
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<td>None</td>
<td>None</td>
<td>None</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Assessment type specific</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Building type specific</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td></td>
</tr>
</tbody>
</table>
Pol 05 Reduction of noise pollution

Assessment criteria

One credit
1  Where there are, or will be, no noise-sensitive areas or buildings within 800m radius of the assessed site.
OR
2  Commission a noise impact assessment compliant with BS4142:2014, if the building has noise-sensitive areas or buildings within 800m radius of the site, with noise levels measured or determined for:
   2.a: Existing background noise levels
      2.a.i  at the nearest or most exposed noise-sensitive development to the proposed development
      2.a.ii including existing plant on a building to which an extension is being built and assessed
   2.b: Rating noise level from the new noise source.
3  The noise impact assessment must be carried out by a suitably qualified acoustic consultant.
4  The noise level from the proposed site or building, as measured in the locality of the nearest or most exposed noise-sensitive development, is a difference to the background noise of at least -5dB throughout the day and night.
5  Where the noise sources from the proposed site or building is greater than the levels described in criterion 4, measures have been installed to attenuate the noise at its source to a level where it will comply with the criterion.

Compliance notes
Compliance notes are located in Appendix G – Notes for compliance on page 18 for the consultation. These compliance notes will be available through the knowledge base when the scheme goes live.

Methodology

Compliance at the design stage
At the design stage of assessment, where noise-sensitive areas or buildings are present, actual measurement is unlikely to be possible due to the planned but non-existent installation. In such situations compliance can be demonstrated through the use of acousticians’ calculations or by scale model investigations.

For such cases, BS4142 states ‘Determine the specific sound level by calculation alone if measurement is not practicable, for example if the source is not yet in operation. In such cases, report the method of calculation in detail and give the reason for using it.’ Where prediction methods are not possible, measurement will be necessary using either a noise source similar to that proposed or, alternatively, measurement of the actual noise from the installation (once installed); compliance with the latter approach requires a written commitment to appoint a
suitably qualified acoustician to carry out the required measurements post-installation, and a further commitment to attenuate the noise source in compliance with criteria 4 on the previous page and 5 on the previous page (if proved necessary by the measurements).

Evidence

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Interim design stage</th>
<th>Final post-construction stage</th>
</tr>
</thead>
<tbody>
<tr>
<td>All</td>
<td>One or more of the appropriate evidence types listed in The BREEAM evidential requirements on page 38 can be used to demonstrate compliance with these criteria.</td>
<td></td>
</tr>
</tbody>
</table>

Definitions

Noise-sensitive area

Landscapes or buildings where the occupiers are likely to be sensitive to noise created by the new plant installed in the assessed building, including:

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 of Outstanding Natural Beauty or near a Site of Special Scientific Interest
8. Any other development that can be considered noise-sensitive.

Not all of these locations will necessarily be “sensitive” at all times. The assessments should be carried out at times which are relevant to the location use. For example, schools, libraries and doctor’s surgeries may not require a night-time assessment of background noise if they are unoccupied at the time. When making the assessment the SQA should make it clear during which periods the receptor is considered “sensitive” providing clear reasoning and justification.

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. An individual who holds a recognised acoustic qualification and membership of an appropriate professional body. The primary professional body for acoustics in the UK is the Institute of Acoustics. 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 sound 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

Attenuating noise at its source
BS 8233-2014(228) gives recommendations for the control of noise in and around buildings and may be a useful reference when considering control of noise from external plant.

See criteria 4 and 5 on page 419.
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 Ltd.

The cost-saving benefits of innovation are fostered and facilitated by helping encourage, drive and publicise accelerated uptake of innovative measures.
Inn 01 Innovation

Aim

To support innovation within the construction industry through the recognition of sustainability related benefits which are not rewarded by standard BREEAM issues.

Value

- Testing out new ideas which, if successful, could change the status quo of the industry
- Allows the industry to explore new opportunities and evolve its processes.

Context

Innovation creates a platform to encourage free thinking, for industry to push the boundaries of what is considered the norm, and propose new ideas and approaches which may change the way the industry works in future.
Innovation allows the industry to grow and develop new ideas, and ultimately produce better buildings, more efficiently.

Assessment scope

<table>
<thead>
<tr>
<th></th>
<th>Fully fitted</th>
<th>Simple building</th>
<th>Shell and core</th>
<th>Shell only</th>
</tr>
</thead>
<tbody>
<tr>
<td>Applicable assessment criteria</td>
<td>1b-1k</td>
<td>All</td>
<td>1b-1j</td>
<td>1b-1d,1f-1j</td>
</tr>
<tr>
<td>Assessment type specific notes</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>None</td>
</tr>
</tbody>
</table>
Inn 01 Innovation

Assessment criteria

Up to a maximum of 10 credits are available in aggregate from a combination of the following:

Exemplary level of performance in existing BREEAM issues

Approved innovations
1. Where the building demonstrates exemplary performance by meeting defined exemplary level performance criteria in one or more of following BREEAM assessment issues:
   1.a: Man 01 Project brief and design (Simple buildings only)
   1.b: Man 03 Responsible construction practices
   1.c: Hea 01 Visual comfort
   1.d: Hea 02 Indoor air quality
   1.e: Ene 01 Reduction of energy use and carbon emissions
   1.f: Wat 01 Water consumption
   1.g: Mat 01 Environmental impacts from construction products - Building life cycle assessment
   1.h: Mat 03 Responsible sourcing of materials
   1.i: Wst 01 Construction waste management
   1.j: Wst 02 Use of recycled and sustainably sourced aggregates
   1.k: Wst 05 Adaptation to climate change
   1.l: Pol 03 Flood and surface water management (Simple buildings only).

Please refer to the relevant BREEAM issue within this scheme document for details of the exemplary level performance assessment criteria.

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.

Compliance notes

Compliance notes are located in Appendix G – Notes for compliance on page 18 for the consultation. These compliance notes will be available through the knowledge base when the scheme goes live.
Methodology

Exemplary level of performance in existing BREEAM issues
For information on the methodology for exemplary level credits refer to the Methodology section of the relevant BREEAM issues.

Approved innovations
Innovation applications can be submitted to BRE Global by a licensed BREEAM Assessor using the formal Approved Innovation Application Form (available from the BREEAM website).

Evidence

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Interim design stage</th>
<th>Final post-construction stage</th>
</tr>
</thead>
<tbody>
<tr>
<td>All</td>
<td>One or more of the appropriate evidence types listed in The BREEAM evidential requirements on page 38 can be used to demonstrate compliance with these criteria.</td>
<td>As defined within existing BREEAM issues.</td>
</tr>
<tr>
<td>1</td>
<td>As defined within existing BREEAM issues.</td>
<td>As defined within existing BREEAM issues.</td>
</tr>
<tr>
<td>2</td>
<td>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.</td>
<td>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.</td>
</tr>
</tbody>
</table>

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.
Applying for innovation credits

Refer to the BREEAM Innovation section documents available from the BREEAM website for more information on BREEAM Innovation credit eligibility criteria, application process, application fees and previously approved innovations.
Appendices
Appendix A – Healthcare building types

BREEAM UK New Construction 2018 can be used to assess the following healthcare establishments:

1. Teaching or specialist hospitals
2. General acute hospitals
3. Community and mental health hospitals
4. GP surgeries
5. Health centres and clinics

Typical facilities and services offered by and forming part of one of the healthcare buildings are described in Table A1 below. If a healthcare development does not fit one of the building type descriptions, it can still be assessed if it falls within the building type category descriptions outlined in the scope section of this document. Where it does not fall in to one of these categories, bespoke assessment criteria will be required to assess the project.

<table>
<thead>
<tr>
<th>Typical descriptions</th>
<th>Facility</th>
<th>Service</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teaching hospital</td>
<td>Inpatient High concentration of energy-intensive engineering services and specialist equipment</td>
<td>Diagnostic and treatment services for physical healthcare together with specialist services consultant-led</td>
</tr>
<tr>
<td>Specialist acute hospital</td>
<td></td>
<td></td>
</tr>
<tr>
<td>General acute hospital</td>
<td>Inpatient Medium concentration of energy-intensive engineering services and specialist equipment</td>
<td>Diagnostic and treatment services for physical healthcare Consultant-led</td>
</tr>
<tr>
<td>Community hospital</td>
<td>Inpatient Basic engineering services and equipment</td>
<td>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</td>
</tr>
<tr>
<td>Cottage hospital</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mental health hospital or unit</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Learning disability unit</td>
<td></td>
<td></td>
</tr>
<tr>
<td>GP surgery</td>
<td>Non-in patient Use typically 50-65 hours per week Basic engineering services and equipment</td>
<td>Primary care consultation GP-led</td>
</tr>
<tr>
<td>Health centre or clinic</td>
<td>Non-in patient Use typically 35-45 hours/week Basic engineering services and equipment</td>
<td>Primary care and mental health Nurse, dental, visiting consultant or specialist</td>
</tr>
</tbody>
</table>

Other ‘healthcare’ associated building types

BREEAM New Construction can also be used to assess the following:

1. Ambulance trust buildings (‘Other buildings’ type)
2. Residential care homes and staff residential accommodation (Multi-residential accommodation building type)
3. Non-patient building types, e.g. offices, laboratories, storage buildings (as listed in the table of building types in the scope section).
Appendix B – Education building types

BREEAM UK New Construction 2018 can be used to assess the following educational establishments:

1. Preschool, including;
   a. Nursery schools(229)
   b. Children's centres(230)
2. Schools, including;
   a. Primary schools
   b. Secondary schools (including those containing sixth form colleges)
   c. All age range schools (including education or teaching buildings at boarding schools)
   d. Academies
   e. Non-acute special educational needs (SEN) schools
3. Sixth form colleges
4. Further and higher education or vocational colleges and Institutions, including;
   a. Teaching facility
   b. Learning Resource Centre
   c. Laboratory, workshop or studio
   d. Student union
   e. Or a mixture of the above types.

All age range schools and academies

All age range schools and academies can typically be assessed using the guidance or criteria applicable to secondary schools. If the school contains functional or operational areas more akin to further or higher education buildings it is more appropriate to use the assessment criteria for further education colleges. If the needs of the accommodation and occupiers are similar to those of primary or early years pupils use the assessment criteria for primary schools. The BREEAM Assessor should determine the most appropriate BREEAM criteria to apply in the assessment of the building.

Acute special educational needs (SEN) schools

Acute special educational needs (SEN) 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 over-stimulated. 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)).

This scheme has not been specifically tailored to assess acute SEN schools. Assessment is still possible, except where highly specialised accommodation is provided. Acute SEN schools are defined as an 'Other' building type and BREEAM 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 Ltd. on the application of alternative building criteria.

For more information on SEN refer to Building Bulletin 102 Designing for disabled children with special educational needs, published by the Department for Children Schools and Families (available from www.education.gov.uk)

Student residential accommodation

This scheme can be used to assess boarding school residential and halls of residence accommodation buildings. These types of building are classified as a multi-residential accommodation building type for a BREEAM assessment.
Appendix C – Multi-residential building types

BREEAM UK New Construction 2018 can be used to assess multi-occupancy residential buildings that are not suitable for assessment under the Home Quality Mark (HQM) in England, Wales and Scotland.

BREEAM UK New Construction 2018 can be used to assess the following types of multi-residential buildings:

1. Student halls of residence
2. Key worker accommodation
3. Care homes that do not contain extensive or specialist medical facilities (i.e. contain limited consulting rooms and medical rooms)
4. Sheltered housing
5. Other multi-residential buildings which contain a mix of residential accommodation with communal areas such as some military accommodation.

Care homes providing acute care

Care homes providing acute care would typically be assessed as either a ‘Healthcare’ or ‘Other’ building type. 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 Ltd. on the application of alternative building criteria if necessary.

BREEAM Multi-residential and the Home quality Mark (HQM)

BREEAM New Construction for non-domestic buildings provides a whole building assessment methodology which can also be applied to a building containing self-contained dwellings and communal facilities.

Where both an HQM and a BREEAM assessment are required, to avoid duplication of effort, evidence collected for the purpose of an HQM assessment can be used towards demonstrating compliance with the equivalent BREEAM assessment criteria and vice versa.
Appendix D – Shell only and Shell and Core Project Assessments

Speculative or non-speculative shell only or shell and core new buildings can be assessed using the BREEAM UK New Construction 2018 scheme.

This section provides guidance to assessors and project teams on the application of BREEAM to shell only and shell and core projects.

A shell only or shell and core building project is defined as one where the developer’s scope of works is the design and construction of the base building only, leaving a range of construction and fit-out works to be completed before the building can be occupied. The project will have some or all of the following elements:

– the structure
– building envelope
– core building systems including building servicing strategy
– installations (such as HVAC) or plant support for installation of such systems
– fit-out of common areas

Category A and B projects
Shell and core projects will often be fitted out to a ‘Category A’ standard, the scope of which varies between different developers, and may include in addition the shell and core of the building the provision of raised floors, suspended ceilings, extension of core services above ceilings across the lettable space, finishes to the internal face of external and core walls and blinds. Upon completion, the whole building or space within the building is sold or let to be fitted out as appropriate for occupation. The new owners or tenants will fit-out the accommodation in accordance with their corporate and operational needs, often referred to as a ‘Category B’ fit-out. These terms widely used in the property sector are not used within BREEAM as the scope of works varies significantly between developers and as such makes them incomparable.

In these projects performance of the building and compliance with BREEAM is verified based on the developer’s scope of works. Two standard project type options are defined with applicable assessment criteria. For projects that in scope from these standard options, assessment against some BREEAM issues will be excluded even where they are within the developer’s scope of works. This approach ensures clarity, consistency and comparability within the property market. Varying the criteria or issues based on each individual projects scope would make BREEAM ratings incomparable in terms of performance benchmarking and for promotional or publicity purposes.

Defining the project type
The scope of assessment and BREEAM certification labelling for a new construction project that is not fully fitted out can be categorised in to one of the following types:

– Shell only assessment and certification
– Shell and core assessment and certification

Shell only assessment
This assessment and certification option is available where the developer’s scope of works covers new build works to the fabric, sub and superstructure of the building only, including:

– External walls, windows, doors (external), roof, core internal walls, structural floors
– Hard and soft landscaping areas (where present and within scope of works)

Shell and core assessment
This assessment and certification option is available where the developer’s scope of works covers shell works, as described for Shell only, plus core building services. Core building services relates to the installation of central or communal transport systems, water systems, fit-out of common areas, central mechanical and electrical systems including HVAC, but without local fitting of systems within tenant areas. The systems will typically be centralised with capped off distribution to each tenanted area (for future connection as part of a tenant’s fit-out works). This
Appendix D – Shell only and Shell and Core Project Assessments

does not include the full scope of a typical Category 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 are liable to change. These items are, therefore, excluded from a shell and core assessment.

The Shell only and Shell and core assessment options are available for all building types.

For these assessments, the scope of works being undertaken must be specified clearly and provided for the accurate certification of the project.

**Assessing new build shell and core projects**

In the main, the assessment process and application of a majority of the BREEAM assessment issues will be unaffected by the scope of the new build shell only or shell and core works. Most of the BREEAM criteria are concerned with impacts, processes and management procedures that occur with any new build development, regardless of whether or not it is a fully fitted project. Several BREEAM issues and criterion are, however, tailored for the assessment of fitted out buildings, for example acoustic performance, and so additional guidance in the form of compliance notes are given in the assessment issues. These Shell only and Shell and core compliance notes confirm whether the assessment issue is applicable to the project and, where it does apply, how to assess it for the project.

*Table D1 on the next page* summarises the BREEAM UK New Construction 2018 assessment issues and their applicability to shell only and shell and core projects.

**Shell only and Shell and Core building assessments and minimum BREEAM standards**

BREEAM standards remain applicable to Shell only and Shell and core building assessments for the developers scope of works. The only exception is minimum standards for BREEAM issues, credits or criteria which are not assessed in a shell only or shell and core project (confirmed by the Compliance Note in the relevant issue).

**Applicability of the Shell only and Shell and core assessment type to Simple buildings assessments**

Shell only and shell and core assessment criteria cannot be applied to Simple building assessments. For a project to be assessed as a Simple Building, it must be clear that the building can be classified as a 'simple'. At the shell only or shell and core stage, it is not possible to determine whether a building will be 'simple' therefore these assessment options are not applicable to Simple building assessments.

**BREEAM UK New Construction and the BREEAM UK Refurbishment and Fit-out scheme**

The BREEAM UK New Construction and BREEAM UK Refurbishment and Fit-out schemes can be used to assess a fully fitted building where the construction works and finishing stages have been carried out separately. A Shell only or Shell and core project assessed under the BREEAM UK New Construction scheme can undergo a first fit-out (and subsequent fit-outs) assessed against the BREEAM UK Refurbishment and Fit-out scheme. Figure D1 illustrates the relationship between the UK New Construction and Refurbishment and Fit-out schemes.
Figure D1 UK New Construction and the UK Refurbishment and Fit-out schemes and the assessment options

The scope of the BREEAM UK New Construction - Shell only and Shell and core assessment types - and BREEAM UK Refurbishment and Fit-out schemes have been defined using recognised industry definitions, such as the British Council for Offices definition of Category A and B fit-out as far as possible. However, in practice, there is no fixed industry standard definition of refurbishment and fit-out works, with a large degree of variability from project to project. Due to this variety and also the need to ensure a consistent definition is used for assessment comparability purposes, the BREEAM Refurbishment and fit-out scheme has defined a number of optional assessment ‘parts’. The scope for each of these assessment parts has largely been based upon setting boundaries around the key physical parameters of the building. Under that scheme, clients are able to seek assessment certification against any combination of parts according to the scope of their refurbishment and fit-out works, therefore providing a highly flexible scheme.

The scope of Part 1 of the BREEAM UK Refurbishment and Fit-out scheme aligns with the shell only option of the BREEAM UK New Construction scheme. Parts 1 and 2 combined align with the shell and core option of the BREEAM UK New Construction scheme. Parts 3 and 4 cover the scope of work that is covered under the tenets fit-out works could be used to ‘top up’ a Shell and Core Assessment.

BREEAM UK Refurbishment and Fit-out scheme assessment types:

- Part 1 - Fabric and structure: external envelope including walls, roof, windows and floor
- Part 2 - Core services: centralised mechanical and electrical plant including heating, cooling and ventilation
- Part 3 - Local services: localised services including lighting, local heating, cooling and ventilation
- Part 4 - Interior design: interior finishes, furniture, fittings and equipment

Further information on the BREEAM UK Refurbishment and Fit-out scheme can be found at www.breeam.com.

Table D1 BREEAM UK New Construction 2018 assessment issues: shell only and shell and core project applicability

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## Appendix D – Shell only and Shell and Core Project Assessments

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Appendix E – Simple Building Assessments

The BREEAM UK New Construction 2018 version can be applied to both complex and less complex building projects. This section provides guidance on its application to less complex projects, i.e. a Simple building assessment.

A Simple building is defined as having building services that are predominantly of limited capacity and local in their delivery, largely independent of other systems in the building fabric and without complex control systems.

If the building includes complex services, systems, functions or facilities including, but not limited to those listed below, it cannot be defined or assessed as a Simple Building and a full BREEAM UK New Construction 2018 assessment should be carried out:

- Air-conditioning (with the exception of local split cooling systems, see Building Services section).
- Full mechanical ventilation, displacement ventilation, and complex passive ventilation (see Building Services section for guidance on permitted systems).
- Renewable energy sources, with the exception of on-site micro-generation technologies (231) or connection to existing community or district heating or cooling systems.
- Laboratories and buildings that contain either fume cupboards or safety cabinets or containment areas.
- Major water-consuming plant or functions such as swimming, hydrotherapy or research pools or vehicle wash or irrigation systems.
- Cold storage plant and enduses, with the exception of domestic scale refrigeration
- Escalators or travelling walkways.

This list is not exhaustive, but serves to indicate the types of services and systems likely to be present in a more complex building and unlikely to be present in a simple building. Examples of a Simple building could (depending on the remit of the works) include: office, educational and community buildings, GP surgeries, basic industrial units and extensions to existing buildings. The Assessor can seek assistance in classifying a project through BREEAM Technical Support by contacting breeamtechnicians@bre.co.uk

The following section describes additional features a Simple Building may have. These descriptions can be used to support the classification of a building of a BREEAM Simple building assessment.

Building services and systems

The following building services and systems can be assessed as a Simple building:

Heating

Space or hot water heating is provided by simple systems only, e.g. systems with total capacity of less than 100kW.

Cooling

Small systems, such as local split cooling systems to service single rooms or areas for occasional or seasonal use, with a total system capacity of less than 12kW (232) and a total collective refrigerant charge of less than 6kg.

Ventilation

1. Single sided and cross ventilation using windows, rooflights or trickle vents
2. Simple ‘bespoke’ passive solutions utilising wind driven or stack ventilation where:
   a. The system does not serve multiple rooms or levels
   b. The system does not use multiple (more than one) control dampers to control air flow
   c. The system uses local standalone controls only and is not linked to a building management system that controls the whole building ventilation strategy
3. Standalone ‘off the shelf’ natural or assisted natural ventilation solutions where:
   a. The system does not serve multiple rooms or levels
   b. The system uses local standalone controls only and is not linked to a building management system that controls the whole building ventilation strategy
   c. The system utilises only basic components, e.g. low power fans, control dampers, filters
d. The product supplier or manufacturer does not recommend specialist commissioning, i.e. no special training is required to ensure the unit is commissioned correctly

4. Local mechanical ventilation where:
   a. The system does not serve multiple rooms or levels
   b. The system uses local standalone controls only and is not linked to a building management system that controls the whole building ventilation strategy
   c. The central fan or air handling unit (AHU) utilises only basic components, e.g. fan, filter, basic air to air heat recovery, and only requires a single phase electrical supply
   d. The system does provide any form of heating, cooling or humidification to the supply air (except via basic air to air heat recovery)
   e. The system does not comprise multiple duct work branches that require proportional balancing
   f. The system is not a Variable Air Volume (VAV) system, i.e. one which comprises variable performance fans and complex control systems that would require specialist commissioning
   g. The central fan or AHU supplier or manufacturer does not recommend specialist commissioning, i.e. no special training is required to ensure the unit is commissioned correctly

Additional Requirements
Domestic scale sanitary, kitchen and laundry facilities with only basic connections for hot and cold water provision and drainage.

Building services commissioning required will be limited in complexity.

Typical profile of a Simple building
The cost and size of a Simple building will vary widely so the Assessor should use the complexity of the building function and its services to determine whether to assess it using the BREEAM Simple building criteria.

If a building does not meet the profile described above, but exhibits features which suggest it could be classified as a Simple building, review this guidance and highlight the areas for further consideration to BREEAM Technical Support by contacting breeamtechnicalcs@bre.co.uk for further advice and classification.

Table 79 below summarises the BREEAM UK New Construction 2018 assessment issues, credits and criteria applicable to a Simple building assessment.

<table>
<thead>
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<th>Issue ID</th>
<th>Criteria applicability to Simple Buildings</th>
<th>Credits available</th>
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## Appendix E – Simple Building Assessments

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Appendix F – Examples of BREEAM UK New Construction certificates

Examples of BREEAM UK New Construction certificates for the interim Design Stage and final post-construction Stage are provided in Figure F1 on page O and Figure F2 on page Q respectively.
Interim Certificate – Design Stage

This is to certify that:

Greenstores Warehouse,
75 Eco Street,
London,
N5 1BU

has been assessed to:

BREEAM New Construction 2014: Industrial (Shell only)

by a licensed assessor for:

Greenstores UK Ltd
and has achieved a score of 87%

Outstanding

Certificate Number: BREEAM-0000-0001 Issue: 1

01 January 2014

Date of Issue

Signed on behalf of BRE Global Ltd.

Gavin Dunn
Director, BREEAM

EcoWarehouses Ltd
Developer

EcoBuilders Ltd
Main Contractor

Smith & Sons Assessing Ltd
Assessor Company

Jon Smith
Licensed Assessor

JS99
Assessor number

EcoDesigners Ltd
Architect

Smith & Sons Assessment
BREEAM Accredited Professional

This certificate is issued by BRE Global Ltd to the Licensed Assessor named above based on their assessment of data provided by the Client and verified at the time of Assessment.
Figure F1 Example of Interim Certificate at Design Stage
Final Certificate

This is to certify that:

Greenstores Warehouse
75 Eco Street,
London,
N5 1BU

has been assessed to:

BREEAM New Construction 2014: Industrial
(Shell only)

by a licensed assessor for:

Greenstores UK Ltd

and has achieved a score of 87%

Outstanding

Certificate Number: BREEAM-0000-0001  Issue: 1

01 January 2014

Date of Issue

Signed on behalf of BRE Global Ltd.

Gavin Dunn

Director, BREEAM

EcoWarehouses Ltd

Developer

EcoBuilders Ltd

Main Contractor

Smith & Sons Assessing Ltd

Assessor Company

Jon Smith

Licensed Assessor

JS99

Assessor number

EcoDesigners Ltd

Architect

Smith & Sons Assessing Ltd

BREEAM Accredited Professional

This certificate is issued by BRE Global Ltd to the Licensed Assessor named above based on their assessment of data provided by the Client and verified at the time of Assessment. This certificate is subject to terms and conditions with BRE Global Ltd. The details and assessment criteria outlined in this certificate are subject to change without notice.
Figure F2 Example of Final Certificate at post-construction Stage
Appendix G – Notes for compliance

Management

Man 01 Project brief and design
No additional issue-specific compliance notes apply.

Man 02 Life cycle cost and service life planning
No additional issue-specific compliance notes apply.

Man 03 Responsible construction practices
No additional issue-specific compliance notes apply.

Man 04 Commissioning and handover
No additional issue-specific compliance notes apply.

Man 05 Aftercare
No additional issue-specific compliance notes apply.

6.0 Energy

Ene 01 Reduction of energy use and carbon emissions
No additional issue-specific compliance notes apply.

Ene 02 Energy monitoring
No additional issue-specific compliance notes apply.

Ene 03 External lighting
No additional issue-specific compliance notes apply.

Ene 04 Low carbon design

| LZC feasibility study timing | When undertaking a feasibility study at a stage later than Concept Design (RIBA Stage 2 or equivalent), the study should highlight the local LZC energy sources which had been discounted due to the constraints placed on the project by the late consideration, and the reason for their omission. The late timing of the feasibility study does not mean that LZC energy sources cannot be specified. If the feasibility study discounted all local LZC as infeasible due to the study being undertaken at a later stage, then the credit for the feasibility study must be withheld. If the feasibility study undertaken at the Concept Design stage or earlier concluded that the specification of any local LZC technology was infeasible, the LZC credit could still be awarded. |

Ene 05 Energy efficient cold storage
No additional issue-specific compliance notes apply.

Ene 06 Energy efficient transport systems
No additional issue-specific compliance notes apply.
Ene 07 Energy efficient laboratory systems
No additional issue-specific compliance notes apply.

Ene 08 Energy efficient equipment
No additional issue-specific compliance notes apply.

8.0 Water

Wat 01 Water consumption
No additional issue-specific compliance notes apply.

Wat 02 Water monitoring
No additional issue-specific compliance notes apply.

Wat 03 Water leak detection
No additional issue-specific compliance notes apply.

Wat 04 Water efficient equipment
No additional issue-specific compliance notes apply.

9.0 Materials

Mat 01 Life cycle impacts
No additional issue-specific compliance notes apply.

Mat 02 Environmental Product Declarations
No additional issue-specific compliance notes apply.

Mat 03 Responsible sourcing of materials

A government licence, e.g. a UK Forestry Commission felling licence certificate, can be used to provide evidence of legally sourced timber but does not meet the definition of a third party timber certification scheme and so does not comply with the responsible sourcing requirements of this issue.

Mat 05 Designing for durability and resilience
No additional issue-specific compliance notes apply.

Mat 06 Material efficiency
No additional issue-specific compliance notes apply.

Transport

Tra 01 Public transport accessibility

Tram services, Tram services are classified as train services when assessing transport accessibility.
Tra 02 Proximity to amenities

<table>
<thead>
<tr>
<th>Collective amenities</th>
<th>The amenities do not need to be ‘standalone’. Amenities present within or as part of another type of amenity, e.g. a cash point or pharmacy in a supermarket, can count towards the number of amenities requirement.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amenities within assessed building or on site</td>
<td>An amenity within the assessed building or on the same site as the proposed development, e.g. where the assessed building is part of a campus, retail or business park or centre, complies with the assessment criteria.</td>
</tr>
</tbody>
</table>

Tra 03 Alternative modes of transport

| Existing compliant facilities and extensions to existing buildings | For assessments on a site where there are already existing compliant facilities, those facilities can be assessed against the requirements of this issue. The existing compliant facilities must be sufficient to cater for the building users of the assessed building as well as the users from any existing buildings. For assessments of new buildings on an existing site, where there are existing compliant facilities, such facilities can be assessed against the requirements of this issue. The number of existing compliant facilities must be large enough to cater for the building users of the assessed building, in addition to the users from any existing buildings. |

Tra 04 Maximum car parking capacity

No additional issue-specific compliance notes apply.

Tra 05 Travel plan

| Existing travel plan | The credit can be awarded if the assessed building is part of a site that has an existing up to date organisational travel plan that is compliant with BREEAM, is applicable to all building users (in existing and assessed new buildings) and accounts for the additional travel resulting from users of the new building. |

Waste

Wst 01 Construction waste management

<table>
<thead>
<tr>
<th>Pre-demolition audit</th>
<th>Where access to the building to carry out the audit is not possible at Concept Design stage, this needs to be justified and evidence provided that the design has included feasibility of refurbishment and consideration of material reuse.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Limited site space for segregation and storage</td>
<td>When space is too limited to allow materials to be segregated on site, a waste contractor can be used to separate and process recyclable materials off-site. Similarly, manufacturers’ take-back schemes can be used. In such cases, evidence must be produced to demonstrate segregation of materials was carried out to the agreed levels and that materials were reused or recycled appropriately. Such evidence could be Environment Agency (EA), Scottish Environment Protection Agency (SEPA), Environment Agency Wales (EA Wales) or Northern Ireland Environment Agency (NIEA) Waste Return Forms.</td>
</tr>
<tr>
<td>Waste from temporary structures</td>
<td>Waste generated on-site for the purposes of the development (excluding demolition and excavation waste) must be included in the assessment of this issue. If temporary support structures, or any other materials or system brought on-site to facilitate construction of a building enter the waste stream (albeit for recycling), they will need to be classified as construction waste and will contribute to the construction waste generated. If the support structure is reused by the contractor (or by another contractor) on other sites, it has not been discarded and does not enter the waste stream. It wouldn’t be included in the waste generated nor be assessed against the benchmark figures. The same would apply to timber formwork where reused.</td>
</tr>
</tbody>
</table>
Wst 02 Use of recycled and sustainably sourced aggregates
No additional issue-specific compliance notes apply.

Wst 03 Operational waste

<table>
<thead>
<tr>
<th>Extension to existing buildings</th>
<th>Facilities within the existing building, can be used to assess compliance. These facilities must cater for the total volume of predicted recyclable waste arising from the new and existing buildings.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Multiple building assessments and buildings that form part of a wider estate See criterion</td>
<td>Where the assessment applies to one or more buildings or units that are part of a wider 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.</td>
</tr>
<tr>
<td>Limited space or vehicle access for a compactor or bailer See criterion</td>
<td>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 bailer.</td>
</tr>
</tbody>
</table>

Wst 04 Speculative floor and ceiling finishes
No additional issue-specific compliance notes apply.

Wst 05 Adaptation to climate change
No additional issue-specific compliance notes apply.

Wst 06 Design for disassembly and adaptability
No additional issue-specific compliance notes apply.

5.0 Health and Wellbeing

Hea 01 Visual comfort

| Education - Education Funding Agency (EFA) requirements | For Education buildings, where the EFA daylighting requirements have been achieved, for all relevant rooms within the building (in accordance with Priority School Building Programme (PSBP) Authority Draft, Facilities Output Specification: Generic Design Brief by the Education Funding Agency, June 2013\(^{234}\)), it can be assumed that the BREEAM daylighting requirements have also been met and therefore the two credits available for daylighting can be awarded by default. In this instance, evidence would need to be provided to demonstrate that the EFA requirements have been achieved. |

Hea 02 Indoor air quality
In healthcare buildings some openings in public and patient areas need to be provided with restricted opening distances of not more than 100mm (HBN 00-10 Part D: Windows and associated hardware[235]). This is for health and safety reasons, especially where windows are within reach of the elderly, mentally ill or children. However, it is felt that good design can overcome these restrictions and provide compliant natural ventilation solutions, even in safety-sensitive areas.

**Hea 03 Safe containment in laboratories**
No additional issue-specific compliance notes apply.

**Hea 04 Thermal comfort**
No additional issue-specific compliance notes apply.

**Hea 05 Acoustic performance**
No additional issue-specific compliance notes apply.

**Hea 06 Safety and security**
No additional issue-specific compliance notes apply.

**Hea 07 Safe and healthy surroundings**
No additional issue-specific compliance notes apply.

**Compliance notes**
Compliance notes are located in Appendix G – Notes for compliance on page 18 for the consultation. These compliance notes will be available through the knowledge base when the scheme goes live.

### 11.0 Land Use and Ecology

**LE 01 Site selection**

<table>
<thead>
<tr>
<th>Asbestos</th>
</tr>
</thead>
</table>

Where the only remediation required is the removal of asbestos within an existing building fabric, the site cannot be classified as contaminated land. However, where asbestos is found to be present in the ground this will be classed as contamination for the purposes of assessing this issue.

### 12.0 Pollution

**Pol 01 Impact of refrigerants**
No additional issue-specific compliance notes apply.

**Pol 02 Local air quality**
No additional issue-specific compliance notes apply.

**Pol 03 Flood and surface water management**

| Functional flood plain |
Appendix G – Notes for compliance

<table>
<thead>
<tr>
<th>Flood defences</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Third party defences</strong></td>
</tr>
<tr>
<td>There are many landscape feature defences, owned by third parties, which due to their location act as a flood defence by default, e.g. motorway, railway embankments, walls etc. It can be assumed that such embankments will remain in place for the lifetime of the development, unless the assessor or project team have reason to believe otherwise. For walls, assurance must be sought that the wall is likely to remain for the design life of the building.</td>
</tr>
</tbody>
</table>

| **Pre-existing flood defences** |
| In an area protected by existing flood defences, (designed to withstand a certain magnitude of flooding), the appropriate number of flood risk credits can be awarded where the defences reduce the risk to ‘low’ or ‘medium’ and the following conditions are met: |
| 1. The development is not located in an area where new flood defences have to be, or have been, constructed to minimise the risk of flooding to the site and its locality purely for the purpose of the development or its wider master plan. |
| 2. The development is located on previously occupied land (as defined by the criteria in BREEAM issue LE 01 Site selection on page 376). |
| 3. The relevant agency confirms that, as a result of such defences, the risk of a flood event occurring is reduced to low or medium risk. If firm confirmation is not provided then the credit cannot be awarded. |

Where a site is situated in multiple flood zones the flood zone with the highest probability of flooding must be considered for the purpose of the BREEAM assessment. This is unless the areas in the higher probability zone only contain soft landscaping and access to the building will be maintained if there is a flooding event.

| 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 into 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. |
| Please see definitions section of Pol03 for a definition of tidal estuary. |

| Highways and impermeable areas |
| Where new non-adoptable highways are built, including those for developments with a mixture of buildings, all of the new impermeable surfaces must be included in calculations to demonstrate compliance with the peak rate of run-off and volume of run-off criteria. Where buildings are built beside existing highways or where adoptable highways are built, the impermeable area of the highway does not need to be included in the calculations. |

| Derelict sites |
| If the site has been derelict for over five years, the appropriate consultant must assess the previous drainage network and make reasonable assumptions to establish probable flow rates and volumes. To do this they should use best practice simulation modelling, to determine the 1 year and 100 year peak flow rates at the relevant discharge points. To complete the calculations, a site visit prior to development will be required unless accurate data already exists from a previous survey. The resultant professional report can then be used to determine the pre-development volumes and rates of run-off. Without this professional input, the site must be deemed greenfield pre-development, assuming Soil type 5 for the calculation of the pre-development site run-off. |

| Rainwater harvesting |
| BS 8515 Rainwater harvesting systems. Code of Practice, Annex A (236) must be followed where rainwater harvesting systems are specified for storm water control. To ensure flood risk is not increased if the rainwater harvesting system is, for some reason, unavailable, the exceedance flow route capacity provided in accordance with CIRIA report CG35 should ignore the beneficial effect of the rainwater harvesting system. |

| 5mm discharge for minimising watercourse pollution |

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The BREEAM credit for locating in a flood zone of ‘medium or high annual probability’ cannot be awarded where the building is located in the functional flood plain. This is defined in the current best practice national planning guidance for each country. If the building assessed is or has been defined as ‘water-compatible development’, confirmation should be provided from the local planning authority that they are satisfied with the proposals.
In a small number of sites it may not be possible for the first 5mm of rainfall to be prevented from leaving site completely. Where this is the case, an appropriately qualified professional must design the system to ensure that the intent of this criterion has been met as far as possible and provide justifications to explain why the criterion could not be fully achieved on the site. Where this can be justified, the awarding of the water quality credit would not be affected, provided all other relevant criteria have been achieved.

### 5mm requirement - end-of-pipe solutions

End-of-pipe solutions, such as ponds and basins, will only be deemed to comply with the 5mm criteria where the principal run-off control to prevent discharge from the first 5mm of a rainfall event, is achieved using source control and site control methods.

### 5mm requirement - green roofs

Green roofs can be deemed to comply with this requirement for the rain that falls onto their surface. However, evidence is still required to demonstrate that the 5mm rainfall from all other hard surfaces on-site is being dealt with, to allow this credit to be awarded.

### Extension or infill building on existing site

Where the assessment is of an individual building on an existing site, i.e. infill development, the watercourse pollution criteria apply to areas within the construction zone that present a risk of pollution, as well as any areas external to the construction zone that are affected by the new works, i.e. drainage onto or from the proposed development.

### Pol 04 Reduction of night time light pollution

If the scope of the assessment is for a new extension only, then only new lighting specified as part of the extended works need to be assessed.

- **Flush stud lighting**
  
  Flush stud lights used for safety purposes in vehicle manoeuvring areas may be excluded from the assessment.

- **Lighting for security purposes**
  
  Where light fittings are specified to comply with specific security standards and these conflict with the BREEAM criteria, they can be excluded from the assessment of this issue. In these circumstances the assessor must obtain evidence confirming the specific security standards and that they are applicable to the assessed development.

### Pol 05 Reduction of noise pollution

- **Untreated buildings**
  
  This assessment issue does not apply to buildings designed to be untreated, i.e. where internal spaces will not be serviced by heating, ventilation or air-conditioning systems and therefore have no noise generating plant. Examples of such building types could include industrial warehouse storage.

- **Existing plant on site**

  The background level from the assessed area should exclude any existing noise from externally mounted plant serving the same building.

### 13.0 Innovation

**Inn 01 Innovation**

No additional issue-specific compliance notes apply.
References

1 For some assessment issues the number of credits available will vary by building type. Furthermore, some issues may not be applicable to certain building types or buildings which do not contain a particular function or area, e.g. a laboratory.

2 For schools, further and higher educational building types, see also Appendix B – Education building types.

3 For healthcare building types, see also Appendix A – Healthcare building types.

4 The prisons category includes any building type that is part of a prison establishment, including residential blocks or a hybrid of building types.

5 For multi-residential building types, see also Appendix C – Multi-residential building types for further detail of scope

6 For the purpose of BREEAM the specific clause of the specification must be referenced within the report.

7 Evidence in the form of design drawings must be presented in a clear, professional working format with clearly identified legends indicating revision number, date, title, owner etc. (where appropriate).


13 RICS. Life cycle costing – RICS professional guidance, UK. RICS; 2016.


21 Carbon Trust. CTG047 Closing the gap: Lessons learned on realising the potential of low carbon building design. Carbon Trust; 2011.


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76 SHTM03-01 Ventilation for healthcare Premises Part A: Design and Validation, Health Facilities Scotland, Feb 2013
87 BS5726:2005. Microbiological safety cabinets. Information to be supplied by the purchaser to the vendor and to the installer, and siting and use of cabinets - Recommendations and guidance. BSI, 2005.
90 PD CEN/TR 16589:2013. Laboratory installations - Capture devices with articulated extract arm. BSI, 2013.
91 CLEAPSS. G9 - Fume cupboards in schools. 2014.
93 Advisory Committee on Dangerous Pathogens. The management, design and operation of microbiological containment laboratories. 1st ed. HSE; 2001.
94 HSE. The genetically modified organisms (Contained Use) Regulations - Guidance on Regulations. HSE; 2014.
95 Advisory Committee on Dangerous Pathogens. Biological agents: Managing the risk in laboratories and healthcare premises. HSE; 2005.
96 HSE. DRAFT - The biological agents and genetically modified organisms (contained use) regulations - Biosafety guidelines. HSE; 2010.
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123 2013 Progress Report to Parliament Committee on Climate Change. Meeting Carbon Budgets. 2013
129 Schneider Electric. Designing a metering system for small and medium sized buildings. 2010
131 CIBSE. TM54: Evaluating operational energy performance of buildings at the design stage. 2013.
136 International Institute of Refrigeration. 17th Informatory Note on Refrigerating Technologies: How to improve energy efficiency in refrigerating equipment. 2003
137 The Carbon Trust. Refrigeration systems: Guide to key energy saving opportunities. 2011
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144 Intelligent Energy Europe E4 project. Energy efficient elevators and escalators. 2010


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CIRIA. Designing for exceedance in urban drainage - good practice C635. CIRIA; 2006.
225 Environment Agency. PPG 1: Understanding Your Environmental Responsibilities - Good Environmental Practice. 2013.
226 Institution of Lighting Professionals. Guidance notes for the reduction of obtrusive light. GN01. 2011;
227 Institution of Lighting Professionals. The Brightness of illuminated advertisements. PLG05. 2015;
229 Nursery school or education means full-time or part-time education suitable for children who have not attained compulsory school age (whether provided at schools or elsewhere); i.e. facilities or buildings for the teaching of children who are between the ages of two or three to five years old.
230 Children’s centres are multi-agency service hubs where young children and their families can receive early education, full day childcare, parental support and child and family health services, such as access to health visitors and health screening. Children’s centres will often be allied to a local primary school, on or adjacent to the school site.
231 Micro-generation is defined under the Energy Act 2004 as <45KWth (micro-heat) and <50KWe (micro-electricity). Micro-generation can refer to community scale energy which may fall within these capacities.
232 To refer to the total for more than one unit where applicable. Multi-split cooling systems and VRF systems cannot be assessed under the Simple Buildings criteria.
233 Typically, complex systems are systems that involve interaction between a number of components to ensure proper operation. They will usually require specific knowledge and expertise to be designed and installed, and they may depend on other systems such as control systems to work effectively.
234 Education Funding Agency. PSBP: facilities and services output specifications. 2014.