



Anderson  
Green

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building services consultants

# BREEAM New Construction 2018 Industrial: Tender Report

*For*

**Welwyn Garden City**

*On behalf of*

**HBD**

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PROJECT REF: NT0826

SECTION			CHECKED		
REF	TITLE	BY	BY	DATE	SIGNED
P02	TENDER REPORT	JN	PSH	02/09/21	

REV	DESCRIPTION	DATE
P01	TENDER ISSUE	16/07/21
P02	TENDER ISSUE	02/09/21

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## 1.0 Introduction to BREEAM

- 1.0 BREEAM (Building Research Establishment's Environmental Assessment Method) is an environmental assessment method for buildings. It sets the standard for best practice in sustainable design and is used to describe a building's environmental performance.
- 1.1 A BREEAM assessment includes ten categories of sustainability including; Management, Health & Wellbeing, Energy, Transport, Water, Materials, Waste, Land Use and Ecology, Pollution, and Innovation.
- 1.2 Credits are awarded in each of the ten categories according to performance. These credits are then added together to produce a single overall score on a scale of Pass, Good, Very Good, Excellent, and Outstanding.
- 1.3 To secure credits evidence must be issued to the BREEAM Assessor demonstrating compliance with the credit criteria. Typically, evidence will be in the form of drawings, specifications, reports, statements, letters etc.
- 1.4 A BREEAM 2018 assessment is a two-stage assessment, with evidence required at both the 'Interim' Design Stage and Final Post Construction Stage of the project.
- 1.5 Note that included in a BREEAM New Construction 2018 assessment are 'mandatory' credits which must be achieved to secure a particular rating regardless of the overall score.
- 1.6 It is the aim of HBD to achieve a BREEAM rating of 'Excellent for the Welwyn Garden City project, which requires a score of not less than 70% under the BREEAM New Construction 2018 (Industrial) methodology.

## 2.0 Introduction to Welwyn Garden City

- 2.0 The proposed scheme comprises a new build industrial development for HBD. The development has a total floor area of circa 6,619m<sup>2</sup> comprising 3 warehouse units with open plan office space, WCs, circulation spaces and general welfare facilities.
- 2.1 The 3 warehouse units are registered with the BRE and each shall be assessed under a single BREEAM New Construction 2018 assessment as an 'Industrial – Warehouse, Storage or Distribution' building.
- 2.2 Section 4.0 of this report contains the BREEAM New Construction 2018 (Industrial) pre-assessment credit spreadsheet, which was completed by Anderson Green as a desktop study based on the current design strategy. The pre-assessment indicates that an 'Excellent' rating is possible.
- 2.3 Achieving the BREEAM 'Excellent' rating will be dependent on the performance of the appointed contractors; therefore, the intention of this report is to make tendering contractors aware of the BREEAM requirements.
- 2.4 The information provided is not exhaustive and the tendering contractors should review this report in full during the tender stage, requesting clarity from the contract administrator and design team on any items required.
- 2.5 Where there are apparent discrepancies between this BREEAM Tender Report and other elements within the tender documentation, the tendering contractors should contact the relevant members of the design team for clarification.
- 2.6 The contractor should be aware that all documentation produced for the purposes of tender is also to be used as evidence for BREEAM.
- 2.7 The contractor should attempt to achieve all credits currently targeted for the Post Construction Stage of the BREEAM assessment. Should any credits be determined unachievable during the construction process, the contractor must pick up credits elsewhere to ensure that the BREEAM score and rating is the same as at the pre-assessment stage, or better.
- 2.8 Where material types or other item types are specified that include the term 'or similar', the definition also includes achievement of the same BREEAM compliance.

## 3.0 Executive Summary

- 3.0 Section 4.0 of this report contains the BREEAM New Construction 2018 (Industrial) pre-assessment credit spreadsheet, which was completed by Anderson Green as a desktop study based on the current design strategy.
- 3.1 The pre-assessment provides a predicted score and corresponding BREEAM rating. For the Welwyn Garden City development, a score of **73.00%**, which corresponds to a BREEAM rating of 'Excellent' ( $\geq 70\%$ ), could be achieved.
- 3.2 The mandatory credits required of a BREEAM 'Excellent' rating appear achievable.
- 3.3 At the current stage of this project, this report would advise that a 5-10% "buffer" is included to account for any alterations which may result in a reduction in the final assessment score. This is currently not included within the scope of the project; however further potential credits have been identified within the pre-assessment credit spreadsheet to enhance the target score. On the specification and implementation of all additional 'potential' credit options, the assessment score would be uplifted to **74.90%**; this equates to a mid 'Excellent' rating.
- 3.4 Note that the inclusion of some credits may require the additional appointment of a specialist consultant or design alteration; however, the majority of these appointments are included within the scope of the tender.
- 3.5 Section 5.0 of this report details those credits where the responsibility lies with the Main Contractor, with further detailed information to be found in Section 9.0 'Appendix A'.
- 3.6 Also appended to this report is the BREEAM New Construction 2018 manual, issue 3.0, which gives full details of all credits and compliance requirements relevant to this project.

## 4.0 Pre-Assessment Credit Calculator

		Available	Targeted	Potential	Comments
<b>Management</b>					
<b>Man 01</b>	Project Brief and Design	4	3	0	<p><b>Project Delivery Planning:</b></p> <ul style="list-style-type: none"> <li>- Consultation with project delivery stakeholders is carried out prior to Concept Design (RIBA Stage 2) covering the minimum BREEAM content [1 credit].</li> </ul> <p><b>Stakeholder Consultation (interested parties):</b></p> <ul style="list-style-type: none"> <li>- Consultation with relevant third-party stakeholders is carried out prior to Concept Design (RIBA Stage 2) covering the minimum BREEAM content [1 credit].</li> </ul> <p><b>BREEAM AP (Concept Design):</b></p> <ul style="list-style-type: none"> <li>- A BREEAM AP is appointed at the feasibility stage (RIBA Stage 1) to facilitate the setting and achievement of BREEAM performance targets for the project [1 credit].</li> </ul> <p><b>BREEAM AP (Developed Design):</b></p> <ul style="list-style-type: none"> <li>- The BREEAM AP attends key design team meetings up to and including the Technical Design stages (RIBA Stage 4) and formally reports progress to the client and design team [1 credit].</li> </ul>
<b>Man 02</b>	Life Cycle Cost and Service Life Planning	4	1	0	<p><b>Elemental Life Cycle Cost (LCC):</b></p> <ul style="list-style-type: none"> <li>- It is assumed that an elemental Life Cycle Cost (LCC) analysis has not been carried out at Concept Design (RIBA Stage 2) in line with the 'Standardised method of life cycle costing for construction procurement' PD 156865: 2008, therefore this credit has not been targeted [2 credits].</li> </ul> <p><b>Component Level Life Cycle Cost Plan:</b></p> <ul style="list-style-type: none"> <li>- It is assumed that a component level LCC plan has not been carried out at Technical Design (RIBA Stage 4) influencing the building and systems design/specification to minimise life cycle costs and maximise critical value, therefore this credit has not been targeted [1 credit].</li> </ul> <p><b>Capital Cost Reporting:</b></p> <ul style="list-style-type: none"> <li>- The capital cost for the building in pounds per square metre (£/m<sup>2</sup>) is reported in the BREEAM Scoring and Reporting Tool [1 credit].</li> </ul>

<p><b>Man 03</b></p>	<p>Responsible Construction Practices</p>	<p>6</p>	<p>6</p>	<p>-</p>	<p><b>Environmental Management:</b>            - Relevant sections/clauses of the building specification/contract/formal letter confirm the requirement for the managing party (e.g., principal contractor, demolition contractor) to operate an environmental management system (EMS) covering their main operations, and best practice pollution prevention guidelines, Working at construction and demolition sites: PPG 6.</p> <p><b>BREEAM AP (site):</b>            - A BREEAM AP is appointed to monitor the project and ensure compliance with the BREEAM targets during Construction, Handover and Close Out stages (RIBA Stages 5 and 6) [1 credit].</p> <p><b>Responsible Construction Management:</b>            - The principal contractor evaluates the risks (on and off site), plans and implements actions to minimise the identified risks, in accordance with items listed, plus six additional items, in Table 4.1 of the BREEAM NC 2018 guidance [2 credits].</p> <p><b>Monitoring of Construction Site Impacts:</b>            - An appropriate individual is appointed to monitor record and report energy use and water consumption resulting from all on-site construction practices [1 credit].            - An appropriate individual is appointed to monitor record and report transport movement and impacts resulting from the delivery of materials to site and construction waste taken from site [1 credit].</p>
<p><b>Man 04</b></p>	<p>Commissioning and Handover</p>	<p>4</p>	<p>4</p>	<p>-</p>	<p><b>Commissioning and Testing Schedule and Responsibilities:</b>            - An appropriate project team member is appointed to monitor and programme pre-commissioning, commissioning and recommissioning of all complex and non-complex systems, including the development of a schedule of commissioning and testing to identify a suitable timescale for commissioning and re-commissioning and the relevant standards that all commissioning activities will be conducted in accordance, and commissioning and testing is included within the contractor's budget and programme of works [1 credit].</p> <p><b>Commissioning Design and Preparation:</b>            - A specialist commissioning manager is appointed during the design stage to carry out responsibilities in line with BREEAM [1 credit].</p> <p><b>Testing and Inspecting Building Fabric:</b>            - A thermographic survey, and where applicable an air-tightness test, is carried out post construction, and any defects identified in the thermographic survey or air tightness testing reports are rectified prior to building handover and close out [1 credit].</p> <p><b>Handover:</b>            - A non-technical Building User Guide is developed prior to handover for distribution to the building occupiers, as well as a technical Building User Guide for premises facilities managers.            - A non-technical training schedule is prepared for the building occupiers, as well as a technical training schedule for premises facilities managers, which includes content in line with the BREEAM criteria [1 credit].</p>

Man 05	Aftercare	3	3	-	<p><b>Aftercare Support:</b></p> <ul style="list-style-type: none"> <li>- Energy and water consumption data is collected for a minimum of 12 months, with systems adjusted as necessary.</li> <li>- Aftercare support is provided for the building occupiers which includes a meeting between the aftercare team and the building occupier/manager, a walkabout of the building, on-site attendance for the first month of building occupation and longer-term aftercare support for at the first 12 months of building occupation [1 credit].</li> </ul> <p><b>Commissioning (implementation):</b></p> <ul style="list-style-type: none"> <li>- Seasonal commissioning is carried out over a minimum 12-month period for simple and complex systems [1 credit].</li> </ul> <p><b>Post Occupancy Evaluation:</b></p> <ul style="list-style-type: none"> <li>- A Post Occupancy Evaluation is carried out by an independent party one year after initial building occupation with appropriate dissemination of the building's post occupancy performance [1 credit].</li> </ul>
<b>Management Totals:</b>		<b>21</b>	<b>17</b>	<b>0</b>	
<b>Management Score Totals:</b>		<b>11.00%</b>	<b>8.90%</b>	<b>0.00%</b>	
<b>Health &amp; Wellbeing</b>					
Hea 01	Visual Comfort	4	2	0	<p><b>Control of Glare from Sunlight:</b></p> <ul style="list-style-type: none"> <li>- A glare control strategy is implemented which maximises daylight levels under all conditions whilst avoiding glare in the workplace [1 credit].</li> </ul> <p><b>Daylighting:</b></p> <ul style="list-style-type: none"> <li>- All relevant building areas meet good practice daylight factors and other criteria as outlined in Table 5.1 and 5.2, or good practice average and minimum daylight illuminance criteria as outlined in Table 5.3 of the BREEAM NC 2018 scheme guidance [1 credit].</li> </ul> <p><b>View Out:</b></p> <ul style="list-style-type: none"> <li>- At least 95% of the floor area in 95% of occupied areas are within 8m of a wall which has a window <math>\geq 20\%</math> of the surrounding wall area [1 credit].</li> </ul> <p><b>Internal and External Lighting Levels, Zoning and Control:</b></p> <ul style="list-style-type: none"> <li>- The internal and external lighting design strategy provides illuminance levels in accordance with the SLL Code for Lighting, 2012, LG 7, BS 5489-1: 2013 and BS EN 12464-2: 2014, and is appropriately zoned with adequate occupant control [1 credit].</li> </ul>
Hea 02	Indoor Air Quality	4	3	1	<p><b>Indoor Air Quality Plan (pre-requisite):</b></p> <ul style="list-style-type: none"> <li>- An Indoor Air Quality Plan is produced, in accordance with GN06, and no later than the end of Concept Design (RIBA Stage 2).</li> </ul> <p><b>Ventilation:</b></p> <ul style="list-style-type: none"> <li>- The building is designed to minimise the indoor concentration and recirculation of pollutants in the building [1 credit].</li> </ul> <p><b>Emissions from Construction Products (potential):</b></p> <ul style="list-style-type: none"> <li>- Three out of five product types meet the emission limits, testing requirements and any additional requirements listed in Table 5.11 of the BREEAM NC 2018 scheme guidance [1 credit]; OR</li> <li>- All product types meet the emission limits, testing requirements and any additional requirements listed in Table 5.11 of the BREEAM NC 2018 scheme guidance [2 credits].</li> </ul>

					<p><b>Post Construction Indoor Air Quality Management:</b></p> <ul style="list-style-type: none"> <li>- VOC and formaldehyde testing is carried out post construction (but pre-occupancy) with measured levels in accordance with the relevant standards.</li> <li>- Where VOC and formaldehyde levels are found to exceed the defined limits, measures are undertaken to reduce the levels to within these limits [1 credit].</li> </ul>
Hea 04	Thermal Comfort	3	3	-	<p><b>Thermal Modelling:</b></p> <ul style="list-style-type: none"> <li>- Thermal modelling is carried out in accordance with CIBSE AM 11 to provide full thermal dynamic analysis demonstrating that the building design and services strategy delivers thermal comfort levels in accordance with the criteria set out in CIBSE Guide A Environmental Design and CIBSE TM52 (for naturally ventilated areas).</li> <li>- The PMV (predicted mean vote) and PPD (predicted percentage dissatisfied) indices are reported [1 credit].</li> </ul> <p><b>Adaptability (for a projected climate change scenario):</b></p> <ul style="list-style-type: none"> <li>- The thermal modelling demonstrates that the above criteria are achieved for a projected climate change environment based on projected climate change weather data [1 credit].</li> </ul> <p><b>Thermal Zoning and Controls:</b></p> <ul style="list-style-type: none"> <li>- A temperature control strategy is produced, informed by the thermal modelling analysis, for the appropriate thermal zoning and occupant control based on discussions with the end user [1 credit].</li> </ul> <p><b>NOTE: the requirements of this credit are applicable to the office area only.</b></p>
Hea 05	Acoustic Performance	3	3	-	<p><b>Acoustic Performance:</b></p> <ul style="list-style-type: none"> <li>- A 'Suitably Qualified Acoustician' is appointed to demonstrate compliance with appropriate acoustic performance standards and testing requirements for sound insulation, indoor ambient noise levels, and room acoustics.</li> <li>- A programme of pre-completion acoustic testing is carried out by a compliant test body to ensure compliance with the relevant standards [3 credits].</li> </ul>
Hea 06	Security	1	0	0	<p><b>Security of Site and Building:</b></p> <ul style="list-style-type: none"> <li>- A 'Suitably Qualified Security Specialist' conducts a Security Needs Assessment (SNA) during or prior to Concept Design (RIBA Stage 2) and any recommendations are implemented on site [1 credit].</li> </ul>
Hea 07	Safe and Healthy Surroundings	2	1	0	<p><b>Safe Access:</b></p> <ul style="list-style-type: none"> <li>- Dedicated cycle paths and pedestrian footpaths are provided from the site entrance to the main building entrance and cycle storage facilities. Where cycle and pedestrian paths cross vehicle access routes and parking areas, appropriate traffic calming measures are specified.</li> <li>- The lighting for access roads, pedestrian areas, footpaths and cycle lanes is in compliance with external lighting criteria set out in Hea 01 Visual Comfort [1 credit].</li> </ul> <p><b>Outside Space:</b></p> <ul style="list-style-type: none"> <li>- There is an outside space providing building users with an external amenity area that meets the BREEAM criteria [1 credit].</li> </ul>

<b>Health &amp; Wellbeing Totals:</b>		<b>17</b>	<b>12</b>	<b>1</b>	
<b>Health &amp; Wellbeing Score Totals:</b>		<b>14.00%</b>	<b>9.88%</b>	<b>0.82%</b>	
<b>Energy</b>					
<b>Ene 01</b>	Reduction of Energy Use and Carbon Emissions	13	4	0	<p><b>Energy Performance:</b></p> <ul style="list-style-type: none"> <li>- Credits awarded based on the performance improvement on the notional building level (as defined by the 2010 - 2013 editions of the Building Regulation, Part L2a) [Potential &lt;9 credits].</li> </ul> <p><b>Prediction of Operational Energy Consumption:</b></p> <ul style="list-style-type: none"> <li>- Additional energy modelling is undertaken during the design and post construction stages to generate predicted operational energy figures, based on consultation with relevant members of the design team. A risk assessment is carried out to highlight any significant design, technical and process risks that should be monitored and managed throughout the construction and commissioning process [4 credits].</li> </ul>
<b>Ene 02</b>	Energy Monitoring	2	2	-	<p><b>Sub-metering of End Use Categories:</b></p> <ul style="list-style-type: none"> <li>- Separate energy meters are installed to enable at least 90% of the estimated annual energy consumption of each fuel to be assigned to the various end-use categories of energy consuming systems.</li> <li>- Energy consuming systems in buildings with a total useful floor area greater than 1000m<sup>2</sup> are metered using an appropriate energy monitoring and management system [1 credit].</li> </ul> <p><b>Sub-metering of High Energy Load and Tenancy Areas:</b></p> <ul style="list-style-type: none"> <li>- An energy monitoring or management system separately meters the energy supplies to tenanted/function areas (office areas, operational areas, ancillary area e.g., canteens etc.) [1 credit].</li> </ul>
<b>Ene 03</b>	External Lighting	1	1	-	<p><b>External Lighting:</b></p> <ul style="list-style-type: none"> <li>- All external light fittings have a luminous efficacy not less than 70 lumens per circuit watt, and controlled to prevent operation during daylight hours and presence detection in areas of intermittent pedestrian traffic. [1 credit].</li> </ul>
<b>Ene 04</b>	Low Carbon Design	3	2	-	<p><b>Passive Design:</b></p> <ul style="list-style-type: none"> <li>- An analysis of the building design/development is carried out to influence decisions made during Concept Design (RIBA Stage 2) to identify opportunities for the implementation of passive design solutions, resulting in a meaningful reduction in the total energy demand [1 credit].</li> </ul> <p><b>Free Cooling:</b></p> <ul style="list-style-type: none"> <li>- The passive design analysis includes an analysis of free cooling and identifies opportunities for the implementation of free cooling solutions in line with the BREEAM criteria [1 credit].</li> </ul> <p><b>Low and Zero Carbon Technologies:</b></p> <ul style="list-style-type: none"> <li>- An LZC feasibility study is carried out at Concept Design Stage (RIBA Stage 2), with the recommendations specified for the development resulting in a reduction in regulated CO<sub>2</sub> emissions [1 credit].</li> </ul>

<b>Ene 06</b>	Energy Efficient Transportation Systems	2	2	-	<p><b>Energy Consumption:</b> - A transport analysis and energy consumption comparison are carried out and the lift with the lowest energy consumption is specified [1 credit].</p> <p><b>Energy Efficient Features:</b> - The three energy efficient features are specified for each lift in line with the BREEAM criteria, and where the use of regenerative drives is demonstrated to save energy, they are specified [1 credit].</p>
<b>Energy Totals:</b>		<b>21</b>	<b>11</b>	<b>0</b>	
<b>Energy Score Totals:</b>		<b>16.00%</b>	<b>8.38%</b>	<b>0.00%</b>	
<b>Transport</b>					
<b>Tra 01</b>	Transport Assessment and Travel Plan	2	2	-	<p><b>Transport Assessment and Travel Plan:</b> - A travel plan and site-specific travel assessment is carried out at Concept Design (RIBA Stage 2), which covers the minimum content defined by BREEAM and includes a package of measures used to steer the design of the development, with any recommendations of the travel plan are implemented on site [2 credits].</p>
<b>Tra 02</b>	Sustainable Transport Measures	10	7	0	<p><b>Transport Options Implementation:</b> - Evidence is provided to demonstrate the sustainable public, private and active transport measures implemented at the site, as outlined in Table 7.4 of the BREEAM NC 2018 scheme guidance [ Potential &lt;10 credits].</p>
<b>Transport Totals:</b>		<b>12</b>	<b>9</b>	<b>0</b>	
<b>Transport Score Totals:</b>		<b>10.00%</b>	<b>7.50%</b>	<b>0.00%</b>	
<b>Water</b>					
<b>Wat 01</b>	Water Consumption	5	3	0	<p><b>Water Consumption:</b> - Low water use sanitary components are specified and installed in line with performance 'Level 3' of the BREEAM criteria, equivalent to a 40% improvement over the baseline building water consumption [Potential &lt;5 credits].</p>
<b>Wat 02</b>	Water Monitoring	1	1	-	<p><b>Water Monitoring:</b> - A pulsed output water meter is installed on the mains incoming supply to the building, and is connected to a BMS for the monitoring of water consumption. - Water consuming plant or building areas consuming 10% or more of the building's total water demand i.e., service areas (covering the supply to outlets within storage, delivery, waste disposal areas etc.) are fitted with separate sub-meters [1 credit].</p>
<b>Wat 03</b>	Water Leak Detection	2	2	-	<p><b>Leak Detection System:</b> - A leak detection system is installed on the mains water supply, which is capable of detecting a leak on the mains supply within the building and between the building and the site boundary [1 credit].</p> <p><b>Flow Control Devices:</b> - Flow control devices are installed on the cold-water supply to each toilet area, connected to PIR controls [1 credit].</p>
<b>Water Totals:</b>		<b>8</b>	<b>6</b>	<b>0</b>	

Water Score Totals:		7.00%	5.25%	0.00%	
<b>Materials</b>					
<b>Mat 01</b>	Environmental Impacts from Construction Products – Building Life Cycle Assessment	7	0	0	<p><b>Superstructure:</b></p> <ul style="list-style-type: none"> <li>- An LCA is carried out on the superstructure design at both Concept Design (RIBA Stage 2) and Technical Design (RIBA Stage 4) [&lt;6 credits].</li> </ul> <p><b>Substructure and Hard Landscaping Options Appraisal:</b></p> <ul style="list-style-type: none"> <li>- An LCA options appraisal of 2 to 4 significantly different superstructure design options is carried out at Concept Design (RIBA Stage 2), and of 2 to 3 significantly different superstructure design options (based on the selected Concept Design option) at Technical Design (RIBA Stage 4) [1 credit].</li> </ul>
<b>Mat 02</b>	Environmental Impacts from Construction Products – Environmental Product Declarations (EPD)	1	0	0	<p><b>Specification of Products with a Recognised Environmental Product Declaration (EPD):</b></p> <ul style="list-style-type: none"> <li>- Specify construction products with EPD that achieve a total EPD points score of at least 20, according to the BREEAM methodology [1 credit].</li> </ul>
<b>Mat 03</b>	Responsible Sourcing of Construction Products	4	3	1	<p><b>Legally Harvested and Traded Timber (pre-requisite):</b></p> <ul style="list-style-type: none"> <li>- All timber and timber-based products are 'legally harvested and traded timber'.</li> </ul> <p><b>Enabling Sustainable Procurement:</b></p> <ul style="list-style-type: none"> <li>- A sustainable procurement plan is produced during Concept Design (RIBA Stage 2), and includes sustainability aims, objectives and strategic targets to guide specification towards sustainable construction products [1 credit].</li> </ul> <p><b>Measuring Responsible Sourcing (potential):</b></p> <ul style="list-style-type: none"> <li>- Applicable building materials are responsibly sourced in accordance with the BREEAM methodology [&lt;3 credits].</li> </ul>
<b>Mat 05</b>	Designing for Durability and Resilience	1	1	-	<p><b>Protecting Vulnerable Parts of the Building from Damage:</b></p> <ul style="list-style-type: none"> <li>- Suitable durability and protection measures are specified to prevent damage to the vulnerable parts of the internal and external building and landscaping elements.</li> </ul> <p><b>Protecting Exposed Parts of the Building from Material Degradation:</b></p> <ul style="list-style-type: none"> <li>- Relevant building elements incorporate design and specification measures to limit material degradation due to environmental factors in accordance with Table 9.14 of the BREEAM NC 2018 scheme guidance [1 credit].</li> </ul>
<b>Mat 06</b>	Material Efficiency	1	1	-	<p><b>Material Efficiency:</b></p> <ul style="list-style-type: none"> <li>- Set targets and report on opportunities and methods to optimise the use of materials for each RIBA Stage (Stages 1-5), following the material efficiency strategy outlined in Table 9.15 of the BREEAM NC 2018 scheme guidance.</li> <li>- Material efficiency measures are implemented during RIBA Stages 3-5, and targets and actual material efficiencies achieved are reported [1 credit].</li> </ul>
<b>Materials Totals:</b>		<b>14</b>	<b>5</b>	<b>1</b>	

Materials Score Totals:		15.00%	5.35%	1.07%	
<b>Waste</b>					
<b>Wst 01</b>	Construction Waste Management	5	5	-	<p><b>Pre-Demolition Audit:</b></p> <ul style="list-style-type: none"> <li>- A pre-demolition audit must be completed for any existing buildings, structures or hard surfaces being considered for demolition. This must be carried out at Concept Design stage by a competent person, guide the design and waste management strategy, and engage all contractors in the process to maximise high grade reuse and recycling.</li> <li>- This must make reference to the audit in the Resource Management Plan (RMP).</li> <li>- Compare actual waste arisings and waste management routes used with those forecast and investigate significant deviations from planned targets.</li> </ul> <p><b>Construction Resource Efficiency:</b></p> <ul style="list-style-type: none"> <li>- A Resource Management Plan (RMP) is developed and the total amount of waste generated on site is not greater than 7.5m<sup>3</sup> or 6.5 tonnes/100m<sup>2</sup> GIFA [&lt;3 credits].</li> </ul> <p><b>Diversion of Resources from Landfill:</b></p> <ul style="list-style-type: none"> <li>- At least 70% (by volume) or 80% (by weight) of non-hazardous construction waste is diverted from landfill.</li> <li>- Waste materials are sorted into separate key waste groups either on site or through a licensed contractor for recovery [1 credit].</li> </ul>
<b>Wst 02</b>	Use of Recycled and Sustainably Sourced Aggregates	1	0	0	<p><b>Pre-requisite:</b></p> <ul style="list-style-type: none"> <li>- A pre-demolition audit of any existing buildings, structures or hard surfaces is carried out in accordance with the criteria outlined in Wst 01 to encourage the reuse of site-won material on site.</li> </ul> <p><b>Project Sustainable Aggregate Points:</b></p> <ul style="list-style-type: none"> <li>- Calculate the Project Sustainable Aggregate points using the BREEAM NC 2018 Wst 02 calculator following the BREEAM methodology [1 credit].</li> </ul>
<b>Wst 03</b>	Operational Waste	1	1	-	<p><b>Operational Waste:</b></p> <ul style="list-style-type: none"> <li>- A dedicated area of at least 2m<sup>2</sup> per 1000m<sup>2</sup> net floor area for buildings 5000m<sup>2</sup> net floor area is provided for the storage and segregation of operational recyclable waste.</li> <li>- Recyclable storage facilities must be conveniently located and accessible to building occupants/facilities operators and clearly labelled to assist with segregation.</li> <li>- Where the consistent generation in volume of operational waste is likely to exist, e.g., large amounts of packaging or compostable waste, a static compactor/baler and vessel(s) for composting organic waste should be provided. A water outlet for cleaning and hygiene purposes is provided where organic waste is to be stored [1 credit].</li> </ul>
<b>Wst 05</b>	Adaptation to Climate Change	1	1	-	<p><b>Resilience of Structural, Fabric and Building Services and Renewables Installation:</b></p> <ul style="list-style-type: none"> <li>- A systematic risk assessment is carried out to identify the impact of expected extreme weather conditions arising from climate change on the building over its projected life cycle, following the BREEAM methodology, with recommendations or solutions proposed at Concept Design implemented where practical and cost effective [1 credit].</li> </ul>

<b>Wst 06</b>	Functional Adaptability	2	2	-	<p><b>Designed for Disassembly and Functional Adaptability – Recommendations:</b></p> <ul style="list-style-type: none"> <li>- A building specific functional adaptation strategy study is carried out by Concept Design (RIBA Stage 2), which explores the ease of disassembly and the functional adaptation potential of different design scenarios, and a set of recommendations or solutions are developed that aim to enable and facilitate disassembly and functional adaptation [1 credit].</li> </ul> <p><b>Disassembly and Functional Adaptability – Implementation:</b></p> <ul style="list-style-type: none"> <li>- An updated functional adaptation strategy study is carried out during Technical Design (RIBA Stage 4), which details how the recommendations or solutions proposed by Concept Design have been implemented where practical and cost effective.</li> <li>- A building adaptability and disassembly guide is produced to communicate the characteristics allowing functional adaptability and disassembly to prospective tenants [1 credit].</li> </ul>
<b>Waste Totals:</b>		<b>10</b>	<b>9</b>	<b>0</b>	
<b>Waste Score Totals:</b>		<b>6.00%</b>	<b>5.40%</b>	<b>0.00%</b>	
<b>Land Use &amp; Ecology</b>					
<b>LE 01</b>	Site Selection	2	2	-	<p><b>Previously Occupied Land:</b></p> <ul style="list-style-type: none"> <li>- At least 75% of the proposed development's footprint is on an area of land which has previously been developed for used by industrial, commercial or domestic purposes in the last 50 years [1 credit].</li> </ul> <p><b>Contaminated Land:</b></p> <ul style="list-style-type: none"> <li>- A site investigation is carried out by a contaminated land specialist to establish the degree of contamination, the contaminant sources/types and the options for remediating sources of pollution which present an unacceptable risk to the site.</li> <li>- Remediation is carried out in line with the remediation strategy [1 credit].</li> </ul>
<b>LE 02</b>	Identifying and Understanding the Risks and Opportunities	2	2	-	<p><b>Assessment Route Selection (pre-requisite):</b></p> <ul style="list-style-type: none"> <li>- A copy GN34 BREEAM Ecological Risk Evaluation Checklist is provided to determine the ecological assessment route, and confirmation that compliance is monitored against all relevant UK and EU or international legislation relating to the ecology of the site is provided.</li> </ul> <p><b>Survey and Evaluation:</b></p> <ul style="list-style-type: none"> <li>- A 'Suitably Qualified Ecologist' is appointed to survey and evaluate the site, prior to the end of Preparation and Brief (RIBA Stage 1), which determines the ecological baseline of the site, taking account of the zone of influence, and informs the site preparation, design and construction works [1 credit].</li> </ul> <p><b>Determining the Ecological Outcomes for the Site:</b></p> <ul style="list-style-type: none"> <li>- The ecological outcome for the site is determined by identifying, appraising and selecting specific solutions and by following the BREEAM hierarchy through liaison with representative stakeholders early in the project to influence key project planning decisions. [1 credit].</li> </ul>
<b>LE 03</b>	Managing Negative Impacts on Ecology	3	3	-	<p><b>Identification and Understanding the Risks and Opportunities for the Site (pre-requisite):</b></p> <ul style="list-style-type: none"> <li>- Evidence is provided to comply with the requirements of LE 02.</li> </ul> <p><b>Planning, Liaison, Implementation and Data:</b></p>

					<p>- Roles and responsibilities are defined for managing negative impacts on the ecology at an early enough stage to influence the Preparation and Brief (RIBA Stage 1) or Concept Design (RIBA Stage 2), and the potential impact of site preparation and construction works on ecology at an early project stage is identified, and details of the proposed solutions and selected measures to be implemented during site preparation and construction works through liaison with representative stakeholders are provided [1 credit].</p> <p><b>Managing Negative Impacts of the Project:</b></p> <p>- Site preparation and construction works have been managed according to the BREEAM hierarchy, and details of the impact on the ecological value of the site are provided [&lt;2 credits].</p>
LE 04	Change and Enhancement of Ecological Value	4	4	-	<p><b>Managing Negative Impacts on Ecology (pre-requisite):</b></p> <p>- Evidence is provided to comply with the requirements of LE 03 (planning, liaison, implementation and data), and confirmation that compliance is monitored against all relevant UK and EU or international legislation relating to the ecology of the site is provided.</p> <p><b>Liaison, Implementation and Data Collation:</b></p> <p>- Liaison with representative stakeholders occurs, and details of the solutions and measures are provided that enhance ecological value either onsite or off site within the zone of influence. Data collated is provided to the local environmental records centres nearest to, or relevant for, the site [1 credit].</p> <p><b>Change and Enhancement of Ecology:</b></p> <p>- Calculations are provided confirming the change in ecological value occurring as a result of the project, in accordance with the process set out in GN36 [&lt;3 credits].</p>
LE 05	Long Term Ecology Management and Maintenance	2	2	-	<p><b>Roles and Responsibilities, Implementation, Statutory Obligations (pre-requisite):</b></p> <p>- Evidence is provided to comply with the requirements of LE 03 (planning, liaison, implementation and data), at least one credit under LE 04 for 'Change and Enhancement of Ecology' is achieved, and confirmation that compliance is monitored against all relevant UK and EU or international legislation relating to the ecology of the site is provided.</p> <p><b>Planning, Liaison, Data, Monitoring and Review Management and Maintenance:</b></p> <p>- Details of monitoring and reporting of the ecological outcomes for site implemented at the design and construction stage are provided, including the effectiveness with which the plans for LE 03 &amp; LE 04 are implemented, through liaison with representative stakeholders.</p> <p>- A section on Ecology and Biodiversity has been provided as part of the tenant or building owner information supplied in order to inform the owner or occupant of local ecological features, value and biodiversity on or near the site, and the landscape and habitat management plan which has been updated to support maintenance of the ecological value of the site [1 credit].</p> <p><b>Landscape and Ecology Management Plan (or similar) Development:</b></p> <p>- A landscape and habitat management plan is produced in accordance with BS 42020: 2013 Section 11.1, covering at least the first five years after project completion [1 credit].</p>
<b>Land Use &amp; Ecology Totals:</b>		<b>13</b>	<b>13</b>	<b>0</b>	

Land Use & Ecology Score Totals:		13.00%	13.00%	0.00%	
<b>Pollution</b>					
<b>Pol 01</b>	Impact of Refrigerants	3	3	-	<p><b>System Compliance (pre-requisite):</b></p> <ul style="list-style-type: none"> <li>- All systems comply with the requirements of BS EN 378: 2008 (parts 2 and 3) and where refrigeration systems containing ammonia are installed, the Institute of Refrigeration Ammonia Refrigeration's Systems Code of Practice.</li> </ul> <p><b>Impact of Refrigerant:</b></p> <ul style="list-style-type: none"> <li>- The building does not require the use of refrigerants within its installed plant/systems [3 credits].</li> </ul> <p>Or either:</p> <ul style="list-style-type: none"> <li>- Systems using refrigerants have Direct Effect Life Cycle CO<sub>2</sub> equivalent emissions (DELCO<sub>2e</sub>) of ≤100 kgCO<sub>2e</sub>/kW cooling/heating capacity [2 credits].</li> <li>Or</li> <li>- Systems using refrigerants have Direct Effect Life Cycle CO<sub>2</sub> equivalent emissions (DELCO<sub>2e</sub>) of ≤1000 kgCO<sub>2e</sub>/kW cooling/heating capacity [1 credit].</li> </ul> <p><b>Leak Detection:</b></p> <ul style="list-style-type: none"> <li>- Systems using refrigerants have a permanent automated refrigerant leak detection system installed or in-built automated diagnostic procedure for detecting leakage capable of automatically isolating and containing the remaining refrigerant(s) charge in response to a leak detection incident [1 credit].</li> </ul>
<b>Pol 02</b>	Local Air Quality	2	1	-	<p><b>Local Air Quality:</b></p> <ul style="list-style-type: none"> <li>- All heating and hot water is supplied by non-combustion systems, or emissions from all installed combustion plant that provide space heating and domestic hot water do not exceed the levels set in Table 12.4 and Table 12.5 of the BREEM NC 2018 scheme guidance [&lt;2 credits].</li> </ul>

<p><b>Pol 03</b></p>	<p>Flood and Surface Water Management</p>	<p>5</p>	<p>5</p>	<p>-</p>	<p><b>Flood Resilience:</b>          - A site specific Flood Risk Assessment (FRA) is carried out, which confirms that there is a low risk of flooding from all sources (fluvial, tidal, surface and ground water, sewers and reservoirs) [2 credits].  <b>Surface Water Run-off (rate):</b>          - Site specific drainage calculations are carried out for the 1 year and 100-year return period events, including an allowance for climate change, and drainage measures are specified to ensure peak-rate of run-off from the developed site is no greater than it was for the pre-developed site [1 credit].  <b>Surface Water Run-off (volume):</b>          - Flooding will not occur in the event of local drainage system failure, and the post-development run-off volume over the development's lifetime, is no greater than it was for the pre-developed site for the 100-year 6-hour event, including an allowance for climate change. Any additional predicted volume of run-off for this event is prevented from leaving the site by using infiltration or other SUDS techniques [1 credit].  <b>Minimising Watercourse Pollution:</b>          - There is no discharge from the pre-developed site for rainfall up to 5mm.          - SUDs or source control systems are specified for low-risk watercourse pollution areas, and oil/petrol separators are specification for high-risk areas.          - All watercourse pollution prevention measures have been designed and installed in accordance with PPG3 and the SUDs manual.          - Where the building has chemical/liquid gas storage areas, shut-off valves are fitted to site drainage system to prevent the escape of chemicals to natural watercourses.          - All external storage and delivery areas are designed and constructed in accordance with the recommendations of the EA's Pollution Prevention Pays Guidance.          - A comprehensive and up-to-date drainage plan will be made available to building occupiers [1 credit].</p>
<p><b>Pol 04</b></p>	<p>Reduction of Night Time Light Pollution</p>	<p>1</p>	<p>1</p>	<p>-</p>	<p><b>Reduction of Night Time Light Pollution:</b>          - External lighting strategy is designed and installed in compliance with Table 2 (and its accompanying notes) of the ILP Guidance notes for the reduction of obtrusive light, 2011.          - All external lighting can be automatically switched off between 23:00hr and 07:00hr using a time clock.          - Any safety or security lighting used between 23:00hr and 07:00hr complies with the lower levels of lighting recommended during these hours in Table 2 of the ILP Guidance notes.          - Illuminated advertisements, where specified, is designed and installed in accordance with the ILP Technical Report 5 - The Brightness of Illuminated Advertisements [1 credit].</p>

<b>Pol 05</b>	Reduction of Noise Pollution	1	1	-	<b>Reduction of Noise Pollution:</b> - A noise impact assessment is carried out by a 'Suitably Qualified Acoustician' in accordance with BS 4142: 2014 for both daytime and night time. The noise level from the assessed building, as measured in the locality of the nearest or most exposed noise-sensitive development, must be at least 5dB lower than the background noise throughout the day and night, with attenuation measures specified and installed where necessary [1 credit].
<b>Pollution Totals:</b>		<b>12</b>	<b>11</b>	<b>0</b>	
<b>Pollution Score Totals:</b>		<b>8.00%</b>	<b>7.33%</b>	<b>0.00%</b>	
<b>Innovation</b>					
<b>Man 03</b>	Responsible Construction Practices	1	1	-	<b>Responsible Construction Management (exemplary level):</b> - The principal contractor evaluates the risks (on and off site), plans and implements actions to minimise the identified risks, in accordance with all items in Table 4.1 of the BREEAM NC 2018 guidance [1 credit].
<b>Hea 01</b>	Visual Comfort	2	0	0	<b>Daylighting (exemplary level):</b> - All relevant building areas meet exemplary daylight factors and the relevant criteria in Table 5.8, or the exemplary average and minimum point illuminance criteria in Table 5.9 of the BREEAM NC 2018 scheme guidance [1 credit]. <b>Internal and External Lighting Levels, Zoning and Control (exemplary level):</b> - 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, and dimming and control gear should avoid flicker noise [1 credit].
<b>Hea 02</b>	Indoor Air Quality	1	0	0	<b>Emissions from Construction Products (exemplary level):</b> - Three of the product types listed in Table 5.12 of the BREEAM NC 2018 scheme guidance meet the emission limits, testing requirements and any additional requirements listed [1 credit].
<b>Hea 06</b>	Security	1	0	0	<b>Security of Site and Building (exemplary level):</b> - A compliant risk-based security rating scheme has been used, which has been confirmed by independent assessment and verification [1 credit].
<b>Ene 01</b>	Reduction of Energy Use and Carbon Emissions	5	0	0	<b>Beyond Zero Net Regulated Carbon (exemplary level):</b> - The building achieves zero net regulated CO <sub>2</sub> emissions and 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 [<2 credits]. <b>Carbon Negative (exemplary level):</b> - The building is deemed carbon negative where >100% of carbon emissions from unregulated (and regulated) energy use are offset by energy generated from on-site and near-site LZC sources [<3 credits]. <b>Post Occupancy Stage (exemplary level):</b> - Achieve maximum available credits for Ene 02 Energy Monitoring, and client or building occupier commits funds to pay for the post occupancy stage to report on the actual energy consumption compared with the targets set [2 credits].
<b>Wat 01</b>	Water Consumption	1	0	0	<b>Water Consumption (exemplary level):</b>

					- A 65% improvement in the water consumption (litres/person/day) for the building when compared against a baseline performance is achieved.
<b>Mat 01</b>	Environmental Impacts from Construction Products - Building Life Cycle Assessment (LCA)	3	0	0	<p><b>Core Building Services Options Appraisal (exemplary level):</b></p> <ul style="list-style-type: none"> <li>- Carry out building LCA options appraisal of at least 3 significantly different core building services design options, with the selected design option integrated into the final design [1 credit].</li> </ul> <p><b>LCA and LCC Alignment (exemplary level):</b></p> <ul style="list-style-type: none"> <li>- Achieve Man 02 Elemental LCC plan and Component Level LCC options appraisal credits. Include design options appraised (superstructure design options, and substructure and hard landscaping options, where applicable) during Concept Design and Technical Design in the Elemental LCC plan and Component Level LCC plan, with the aligned LCA and LCC options appraisal activity integrated within the wider design decision-making process [1 credit].</li> </ul> <p><b>Third Party Verification (exemplary level):</b></p> <ul style="list-style-type: none"> <li>- A suitably qualified third party either carries out the building LCA work or verifies the building LCA work (if by others), and produces a report describing how they have checked the building LCA work accurately represent the designs under consideration during Concept Design and Technical Design [1 credit].</li> </ul>
<b>Mat 03</b>	Responsible Sourcing of Construction Products	1	0	0	<p><b>Measuring Responsible Sourcing (exemplary level):</b></p> <ul style="list-style-type: none"> <li>- Applicable building materials are responsibly sourced in accordance with the BREEAM methodology for exemplary level performance [1 credit]</li> </ul>
<b>Wst 01</b>	Construction Waste Management	1	0	0	<p><b>Construction Resource Efficiency and Diversion of Resources from Landfill (exemplary level):</b></p> <ul style="list-style-type: none"> <li>- A Resource Management Plan (RMP) is developed and the total amount of waste generated on site is not greater than 1.6m<sup>3</sup> or 1.9 tonnes/100m<sup>2</sup> GIFA.</li> <li>- At least 85% (by volume) or 90% (by weight) of non-hazardous construction waste is diverted from landfill.</li> <li>- Waste materials are sorted into separate key waste groups either on site or through a licensed contractor for recovery [1 credit].</li> </ul>
<b>Wst 02</b>	Use of Recycled and Sustainably Sourced Aggregates	1	0	0	<p><b>Pre-requisite and Project Sustainable Aggregate Points (exemplary level):</b></p> <ul style="list-style-type: none"> <li>- The Project Sustainable Aggregate Points score meets or exceeds the exemplary level performance benchmark [1 credit].</li> </ul>
<b>Wst 05</b>	Adaption to Climate Change	1	0	0	<p><b>Responding to Climate Change (exemplary level):</b></p> <ul style="list-style-type: none"> <li>- Achievement of the standard credit criteria and the following criteria points or credits:</li> </ul> <p><b>Hea 04 Thermal Comfort</b></p> <ul style="list-style-type: none"> <li>- Criterion 6 in the second credit of the Hea 04 issue.</li> </ul> <p><b>Ene 01 Reduction of Energy Use and Carbon Emissions</b></p> <ul style="list-style-type: none"> <li>- At least six credits in this issue have been achieved.</li> </ul> <p><b>Ene 04 Low Carbon Design</b></p> <ul style="list-style-type: none"> <li>- The passive design analysis credit in this issue has been achieved.</li> </ul>

					<p><b>Wat 01 Water Consumption</b> - A minimum of three credits in this issue have been achieved.</p> <p><b>Mat 05 Designing for Durability and Resilience</b> - Criterion 2 relating to material degradation in this issue has been achieved.</p> <p><b>Pol 03 Flood and Surface Water Management</b> - Flood resilience - a minimum of one credit has been achieved. - Surface water run-off - two credits have been achieved [1 credit].</p>
<b>LE 02</b>	Identifying and Understanding the Risks and Opportunities	1	0	0	<p><b>Determining the Ecological Outcomes for the Site (sustainability-related activities) (exemplary level):</b> - When determining the optimal ecological outcome for the site consider the wider site sustainability-related activities and the potential for ecosystem service-related benefits, and achieve the credits of the assessment issues outlined below:</p> <p><b>Hea 07 Safe and Healthy Surroundings</b> - Both credits (Safe Access and Outside Space)</p> <p><b>Pol 03 Flood and Surface Water Management</b> - Achieve credits for 'Surface water run-off' and 'Minimising watercourse pollution'</p> <p><b>Pol 05 Reduction of Noise Pollution</b> - Achieve this credit [1 credit].</p>
<b>LE 04</b>	Change and Enhancement of Ecological Value	1	1	-	<p><b>Change and Enhancement of Ecology (exemplary level):</b> - The change in ecological value occurring is calculated in accordance with the process set out in GN36, resulting in a significant net gain of ecological value [1 credit].</p>
<b>Innovation Totals:</b>		<b>10</b>	<b>2</b>	<b>-</b>	
<b>Innovation score totals:</b>		<b>10.00%</b>	<b>2.00%</b>	<b>0.00%</b>	
<b>OVERALL SCORE TOTALS:</b>		<b>110%</b>	<b>73.00%</b>	<b>74.90%</b>	<b>'Excellent' RATING</b>

## 5.0 Main Contractor Responsibilities

- 5.0 The BREEAM New Construction 2018 (Industrial) pre-assessment credit spreadsheet contained in Section 4.0 provides the key responsibilities and requirements of each BREEAM credit being attempted and should be consulted when assessing the input required from the main contractor and their team. All documentary evidence shall be provided to the BREEAM assessor on request during design, construction and upon practical completion.
- 5.1 The main contractor and their sub-contractors must ensure that all credits targeted within the pre-assessment document are achieved and that their responsibilities relating to the BREEAM elements of the tender documentation package are met in line with the BREEAM criteria.
- 5.2 The following table lists the BREEAM credits targeted by the project team that will require commitment and input from the appointed main contractor and their team. The main contractor responsibilities identified in this section are items which may not be fully covered within the other tender documentation issued by the design team.
- 5.3 For full details of those credits requiring input from the main contractor please refer to Appendix A: Main Contractor Responsibilities and Appendix B: BREEAM New Construction 2018 manual, Issue 3.0.
- 5.4 It is important to note that it is the responsibility of the main contractor and associated sub-contractors to ensure that each credit targeted by the design team is implemented at the construction phase of the project. Where there is apparent discrepancy within the tender documentation relating to credits targeted within the BREEAM tender report, the main contractor should seek clarification from the design team.
- 5.5 The credits highlighted in grey refer to 'mandatory' issues which must be achieved in order to attain the 'Excellent' rating.

ACTION	CREDIT	SUMMARY/COMMENTS
<b>Management Credits</b>		
<b>Main Contractor</b>	Man 03 Responsible Construction Practices	Legally Harvested and Traded Timber Ensure all timber and timber-based products used on the project are 'Legally harvested and traded timber'.
<b>Main Contractor</b>		Environmental Management Operate with an EMS certificate and implement best practice pollution prevention policies and procedures on site in accordance with PPG 6.
<b>Main Contractor</b>		Responsible Construction Management Evaluate risks (on and off site), plan and implement actions to minimise the identified risks, in accordance with items listed, plus six additional items, in Table 4.1 of the BREEAM NC 2018 guidance.
<b>Main Contractor</b>		Monitoring of Construction Site Impacts Meter, target and record site energy (kWh) and water (m <sup>3</sup> ) consumption resulting from the use of construction plant, equipment (mobile and fixed) and site accommodation, and transport movements and impacts resulting from the delivery and construction materials to site and construction waste from site.
<b>Main Contractor &amp; Mechanical &amp; Electrical Contractor</b>	Man 04 Commissioning and Handover	Commissioning and Testing Schedule and Responsibilities Appointment of a commissioning manager to monitor and review/programme/manage the design, pre-commissioning, commissioning and re-commissioning in line with Building Regulations/BSRIA/CIBSE guidelines, including the development of a schedule of commissioning and testing to identify a suitable timescale for commissioning.
<b>Main Contractor &amp; Mechanical &amp; Electrical Contractor</b>		Commissioning Design and Preparation Appointment of specialist commissioning agents for the complex systems, including BMS, where relevant.

<b>Main Contractor</b>		Testing and Inspection Building Fabric	A thermographic survey, and where applicable an air-tightness test, is carried out post construction, and any defects identified in the thermographic survey or air tightness testing reports are rectified prior to building handover and close out.
<b>Main Contractor &amp; Mechanical &amp; Electrical Contractor</b>		Handover	Compile a fully compliant non-technical BREEM Building User Guide (BUG) relevant to the general user as well as a fully compliant technical BREEM Building User Guide relevant to the premises facilities managers, and produce a non-technical schedule of training for relevant building occupiers as well as a technical training schedule for premises facilities managers, which includes content in line with the BREEM criteria.
<b>Main Contractor</b>	Man 05 Aftercare	Aftercare Support	Provide aftercare training and support for all building occupiers, including introduction to aftercare team and BUG, walk around and training for the facilities manager, weekly site attendance for one-month post-handover and longer-term aftercare i.e., helpline for 12 months of occupation.
<b>Main Contractor</b>		Commissioning (Implementation)	Confirm that the seasonal commissioning activities in accordance with the BREEM Criteria will take place.
<b>Health and Wellbeing Credits</b>			
<b>Main Contractor</b>	Hea 01 Visual Comfort	Control of Glare from Sunlight	Ensure the installation of a compliant glare control strategy, which maximises daylight levels under all conditions whilst avoiding glare in the workplace.
<b>Electrical Contractor</b>		Internal and External Lighting Levels, Zoning and Control	Ensure the internal and external lighting design strategy provides illuminance levels in accordance with the SLL Code for

			Lighting 2012, LG 7, BS 5489-1: 2013 and BS EN 12464-2: 2014.  Ensure zoning of all lighting allows for varying occupancy, with separate occupant control per lighting zone.
<b>Main Contractor &amp; Mechanical &amp; Electrical Contractor</b>	Hea 02 Indoor Air Quality	Indoor Air Quality Plan	Production of an Indoor Air Quality plan, which considers: the removal of contaminant sources; dilution and control of contaminant sources; procedures for pre-occupancy flush out; 3 <sup>rd</sup> party testing and analysis and maintaining indoor air quality in use.
<b>Main Contractor &amp; Mechanical Contractor</b>		Ventilation	Ensure a pre-demolition audit is completed at Concept Design stage by a competent person.
<b>Main Contractor</b>		Emission from Construction Products	Ensure all fittings and finishes within the building have low emissions of Volatile Organic Compounds (VOC's) in line with the relevant standards.
<b>Main Contractor</b>		Post Construction Indoor Air Quality Measurement	Allow for pre-completion indoor air quality testing for TVOC and formaldehyde, and carry out associated remedial works if the required levels are not met.
<b>Mechanical Contractor</b>	Hea 04 Thermal Comfort	Thermal Modelling	Production of a CIBSE AM11 compliant fully dynamic thermal model in line with CIBSE Guide A & TM52.
<b>Mechanical Contractor</b>		Thermal Zoning and Controls	Production of a temperature control strategy, informed by the thermal modelling, to ensure appropriate occupant controls throughout the building.
<b>Main Contractor</b>	Hea 05 Acoustic Performance	Sound Insulation, Indoor Ambient Noise Levels and Reverberation	Allow for pre-completion acoustic testing and carry out any remedial works prior to handover and occupation.
<b>Main Contractor</b>	Hea 07 Safe and Healthy Surroundings	Outside Space	Ensure the implementation of an outside space providing building users with an external amenity area.

Energy Credits			
<b>Main Contractor</b>	Ene 01 Reduction of Energy Use and Carbon Emissions	Energy Performance	Carry out energy modelling using approved building energy calculation software to produce a Building Regulations Output document based on the 'As built' stage of analysis.
<b>Mechanical &amp; Electrical Contractor</b>	Ene 02 Energy Metering	Sub-metering of End Use Categories	Installation and labelling of separate sub-meters to enable at least 90% of the estimated annual energy consumption of each fuel to be assigned to the various end use categories.
<b>Mechanical &amp; Electrical Contractor</b>		Sub-metering of High Energy Load and Tenancy Areas	Installation and labelling of separate sub-meters per tenancy/function areas present.
<b>Electrical Contractor</b>	Ene 03 External Lighting	External Lighting	Ensure the average luminous efficacy for external light fittings is not less than 70 lumens per circuit Watt, and is controlled via time clock and photocell with presence detection in areas of intermittent pedestrian traffic.
<b>Main Contractor</b>	Ene 04 Low Carbon Design	Passive design	ensure the passive design measures recommended in the passive design analysis shall be installed on site in order to achieve a reduction in the total heating, cooling, mechanical ventilation, lighting loads and energy consumption.
		Low and Zero Carbon Technologies	Ensure the installation of low and zero carbon technology/technologies in line with the recommendations of the low and zero carbon feasibility study.
<b>Main Contractor</b>	Ene 06 Energy Efficient Transportation Systems	Energy Consumption	Carry out a transport analysis and a comparison of two energy efficient lifts in accordance with the relevant standards, with the lowest energy consuming lift specified.
<b>Main Contractor</b>		Energy Efficient Features	Ensure the energy efficient features defined by BREEAM are specified.

Transport Credits			
<b>Main Contractor</b>	Tra 01 Transport Assessment and Travel Plan	Transport Assessment and Travel Plan	Ensure the installation of any physical recommendations made by the Travel Plan.
<b>Main Contractor</b>	Tra 02 Sustainable Transport Measures	Travel Options Implementation	Ensure the installation of sustainable public, private and active transport measures, as outlined in Table 7.4 of the BREEAM NC 2018 scheme guidance.
Water Credits			
<b>Main Contractor &amp; Mechanical Contractor</b>	Wat 01 Water Consumption	Water Consumption	Ensure the installation of low water use WC's, urinals, taps (wash hand basin and kitchen), showers and domestic/commercial scale appliances.
<b>Main Contractor &amp; Mechanical Contractor</b>	Wat 02 Water Monitoring	Water Monitoring	Ensure the installation of a pulsed-output water meter on the mains incoming water supply.  Any water consuming plant or building areas responsible for 10% or more of the building's total water demand shall be fitted with separate sub-meters.
<b>Main Contractor &amp; Mechanical Contractor</b>	Wat 03 Water Leak Detection	Leak Detection System	Ensure the installation of a BREEAM compliant water leak detection system covering the mains water supply within the building and between the building and the site boundary.
<b>Mechanical Contractor</b>		Flow Control Devices	Ensure the installation of flow control devices i.e., solenoid valves connected to PIR detectors, covering the cold-water supply to each WC area/facility.
Materials Credits			
<b>Main Contractor</b>	Mat 03	Legally Harvested and Traded Timber	Ensure all timber and timber-based products used on the project are 'Legally harvested and traded timber'.

<b>Main Contractor</b>	Responsible Sourcing of Construction Products	Enabling Sustainable Procurement	Production of a Sustainable Procurement Plan, which includes sustainability aims, objectives and strategic targets to guide specification towards sustainable construction products.
<b>Main Contractor</b>		Responsible Sourcing of Materials	Ensure materials used to construct the main building elements are sourced from manufacturers with appropriate EMS certification.
<b>Main Contractor</b>	Mat 05 Designing for Durability and Resilience	Protecting Vulnerable Parts of the Building from Damage	Ensure the implementation of the durability/protection measures against vulnerable areas (internally and externally) of the development.
		Protecting Exposed Parts of the Building from Material Degradation	Ensure the implementation of protection measures to limit material degradation.
<b>Main Contractor</b>	Mat 06 Material Efficiency	Material Efficiency	Ensure that appropriate measures are implemented in order to optimise material use throughout construction to ensure waste prevention and reduction.
<b>Waste Credits</b>			
<b>Main Contractor</b>	Wst 01 Construction Waste Management	Construction Resource Efficiency	Produce a BREEAM Site Waste Management Plan and ensure that construction waste generated is restricted to ≤6.5 tonnes / 7.5m <sup>3</sup> per 100m <sup>2</sup> gross internal floor area.
<b>Main Contractor</b>		Diversion of Resources from Landfill	Ensure at least 80% (by weight) or 70% (by volume) of non-hazardous construction waste is diverted from landfill.

<b>Main Contractor &amp; Mechanical Contractor</b>	Wst 03 Operational Waste	Operational Waste	<p>Ensure the installation of a recyclable waste storage area, in addition to the general waste storage area, of at least 2m<sup>2</sup> per 1000m<sup>2</sup> net floor area for buildings &lt;5000m<sup>2</sup>.</p> <p>All facilities must be labelled and adequately sized.</p> <p>Ensure the installation of a compactor/baler and/or composting vessel with water outlet, where appropriate.</p>
<b>Ecology Credits</b>			
<b>Main Contractor &amp; Ecologist</b>	LE 03 Managing Negative Impacts on Ecology	Managing Negative Impacts of the Project	Site preparation and construction works have been managed according to the BREEAM hierarchy and recommendations made by the appointed 'Suitably Qualified Ecologist'.
<b>Main Contractor &amp; Ecologist</b>	LE 04 Change and Enhancement of Ecological Value	Change and Enhancement of Ecology	Ensure that the ecologist's recommendations are implemented in the landscaping scheme to ensure the calculated change and enhancement of ecology is achieved
<b>Pollution Credits</b>			
<b>Main Contractor &amp; Mechanical Contractor</b>	Pol 01 Impact of Refrigerants	Impact of Refrigerants	Ensure the installation of a BREEAM compliant refrigerant cooling system which complies with BS EN 378:2016 parts 1 & 2.
		Leak Detection	Ensure the refrigerant cooling is hermetically sealed, or features a BREEAM compliant automatic refrigerant leak detection system installed which is able to manage the remaining refrigerant charge.

<b>Main Contractor &amp; Mechanical Contractor</b>	Pol 02 Local Air Quality	Local Air Quality	Provide relevant documentation confirming that all heating and hot water is supplied by non-combustion systems, or emissions from installed combustion plant do not exceed the levels set in the BREEAM 2018 guide.
<b>Main Contractor</b>	Pol 03 Flood and Surface Water Management	Surface Water Run-Off (Rate and Volume)	Ensure the installation of attenuation measures as per the drainage design and Flood Risk Assessment.
<b>Main Contractor &amp; Electrical Contractor</b>	Pol 04 Reduction of Night Time Light Pollution	Reduction of Night Time Light Pollution	Ensure the installation of external lighting in accordance with the Table 2 of the ILP Guidance notes, and automatic control to enable lighting to automatically switch off between 23.00hr and 07.00hr.
<b>Main Contractor</b>	Pol 05 Reduction of Noise Pollution	Reduction of Noise Pollution	Appointment of a 'Suitably Qualified Acoustician' to carry out a noise impact assessment in line with BS 7445, with attenuation measures installed where necessary.
<b>Innovation Credits</b>			
<b>Main Contractor</b>	Man 03 Responsible Construction Practices	Responsible Construction Management	Evaluate risks (on and off site), plan and implement actions to minimise the identified risks, in accordance with items listed, plus commitment to achieve all items listed in Table 4.1 of the BREEAM NC 2018 guidance.
<b>Main Contractor &amp; Ecologist</b>	LE 04 Change and Enhancement of Ecological Value	Change and Enhancement of Ecology	Ensure that the ecologist's recommendations are implemented in the landscaping scheme to ensure that significant net gain of ecology has been achieved.

## 6.0 BREEAM Scores and Weightings

6.0 The rating benchmarks for the 2018 version of BREEAM are outlined below for New Construction buildings.

### BREEAM 2018 rating benchmarks

BREEAM Rating	Score in %
Unclassified	< 30
Pass	≥ 30
Good	≥ 45
Very Good	≥ 55
Excellent	≥ 70
Outstanding	≥ 85

6.1 The table below details the weightings for each of the nine environmental sections included in the BREEAM 2018 New Construction scheme.

### BREEAM 2018 environmental section weightings

BREEAM Section	Weighting			
	Full fitted out	Simple building	Shell and core only	Shell only
Management	11%	7.5%	11%	12%
Health & Wellbeing	14%	16.5%	8%	7%
Energy	16%	11.5%	14%	9.5%
Transport	10%	11.5%	11.5%	14.5%
Water	7%	7.5%	7%	2%
Materials	15%	17.5%	17.5%	22%
Waste	6%	7%	7%	8%
Land Use & Ecology	13%	15%	15%	19%
Pollution	8%	6%	9%	6%
Total	100%	100%	100%	100%
Innovation	10%	10%	10%	10%

## 7.0 BREEAM Minimum Standards

7.0 To achieve a BREEAM rating, the minimum percentage score (refer to 5.7 above) must be achieved and the minimum standards applicable to that rating level (refer to the table below) must be complied with. The ‘Excellent’ related credits are highlighted, issues which cannot be compromised within the scope of the development.

Minimum BREEAM standards by rating level Minimum standards by BREEAM rating level					
BREEAM Issue	PASS	GOOD	VERY GOOD	EXCELLENT	OUTSTAND'
Man 03: Responsible Construction Practices	None	None	None	One credit (responsible construction management)	Two credits (Responsible construction management)
Man 04: Commissioning and Handover	None	None	One Credit (commissioning – test schedule and responsibilities)	One Credit (commissioning – test schedule and responsibilities)	One Credit (commissioning – test schedule and responsibilities)
Man 04: Commissioning and Handover	None	None	Criterion 11 (Building User Guide)	Criterion 11 (Building User Guide)	Criterion 11 (Building User Guide)
Man 05: Aftercare	None	None	None	One Credit (commissioning - implementation)	One Credit (commissioning - implementation)
Ene 01: Reduction of Energy Use and Carbon Emissions	None	None	None	Four credits (Energy performance)	Six credits (Energy performance) and Four credits (energy modelling and reporting)
Ene 02: Energy Monitoring	None	None	One Credit (First sub-metering credit)	One Credit (First sub-metering credit)	One Credit (First sub-metering credit)
Wat 01: Water Consumption	None	One credit	One credit	One credit	Two credits
Wat 02: Water Monitoring	None	Criterion 1 only	Criterion 1 only	Criterion 1 only	Criterion 1 only
Mat 03: Responsible Sourcing of Construction Products	Criterion 1 only	Criterion 1 only	Criterion 1 only	Criterion 1 only	Criterion 1 only
Wst 03: Operational Waste	None	None	None	One credit	One credit

## 8.0 Disclaimer

The pre-assessment offers a quick evaluation of the likely rating to be achieved under a formal BREEAM New Construction 2018 assessment. Predicted ratings may change during the design and construction phases under formal assessment by a licensed BREEAM assessor, subject to the performance of the design and project team.

## 9.0 Appendices

### 9.1 Appendix A – Main Contractor Responsibilities BREEAM Credit Requirements

This Appendix details the main contractor items and responsibilities included within the BREEAM New Construction 2018 (Industrial) pre-assessment credit spreadsheet (Section 4.0) and associated main contractor responsibilities table (Section 5.0) that are not fully covered in other preliminaries documents.

It is important to note that the credits relevant to the main contractor and their associated sub-contractor(s) not included within this section are included in other preliminaries documentation. It is the responsibility of the main contractor to ensure that each credit targeted by the design team is implemented at the construction phase of the project. Where there is apparent discrepancy within the tender documentation, the main contractor should seek clarification from the design team.

#### 9.1.1 MANAGEMENT

##### 9.1.1.1 MAN 03: Responsible Construction Practices

###### Legally Harvested and Traded Timber

The main contractor shall procure 'Legally harvested and traded timber' during construction, including formwork, site hoardings and other temporary site timber used for the purpose of facilitating construction.

BREEAM follows the UK Government's definition of legally sourced timber, as outlined in the Central Point of Expertise on Timber (CPET) 5<sup>th</sup> Edition report on the UK Government's Timber Procurement Policy (TPP). The policy requires all timber and wood-based products to be covered by at least one of the following:

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

For the avoidance of doubt, 100% of the timber and timber-based products must be compliant. Manufacturer's details and timber certification shall be provided in order to demonstrate compliance.

Further information in the UK Government's Timber Procurement Policy and compliant responsible sourcing certification schemes is available from the CPET (Central Point of Expertise on Timber) website: [www.cpet.org.uk/](http://www.cpet.org.uk/)

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.

### **Environmental Management**

The main contractor shall operate an Environmental Management System covering their main operations. The EMS must be either: -

- Third party certified, to ISO 14001: 2015, EMAS (EU Eco-Management and Audit Scheme) or equivalent standard/EMAS or equivalent standard;

OR

- In compliance with BS 8555: 2016 have:
  - i. Appropriate structure
  - ii. Reached implementation stage phase four 'implementation and operation of the environmental management system'
  - iii. Completed defined phase audits one to four.

The main contractor shall take all appropriate measures to avoid nuisance arising from dust or fumes, or any other airborne pollutants and watercourse pollutants, and shall adopt best practice prevention policies and procedures on site in accordance with Pollution Prevention Guidelines, Working at construction and demolition site: PPG 6.

The main contractor shall disseminate all best practice above to all relevant site operatives through induction and tool-box talks during site activities.

### **Responsible Construction Management**

The main contractor shall achieve items listed in the table below, as follows:

- Items as required for one credit
- Six additional items (two credits)
- **All items as required for one exemplary credit**

Ref	Criteria	Required for one credit
<b>Risk Evaluation and Implementation</b>		
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:		
<b>Vehicle movement</b>		
a	Manage the construction site entrance to minimise the impacts (e.g., safety, disruption) arising from vehicles approaching and leaving the development footprint.	Yes
b	Ensure the development footprint is accessible for delivery vehicles fitted with safety features (e.g., side under run protection) to remove or limit the need for on-street loading or unloading. Where on-street loading is unavoidable, this should be appropriately managed.	
c	Identify access routes to the development footprint, including for heavy vehicles to minimise traffic disruption and safety risks to others.	
<b>Pollution management</b>		
d	Minimise the risks of air, land and water pollution.	Yes
e	Minimise the risks of nuisance from vibration, light and noise pollution.	
<b>Tidiness</b>		
f	Practices ensure the development footprint is safe, clean and organised at all times. This includes, but is not limited to, facilities, materials and waste storage.	Yes
g	Ensure clear and safe access in and around the buildings at the point of handover.	Yes
<b>Health and wellbeing</b>		
h	Provide processes and equipment required to respond to medical emergencies.	Yes
i	The principal contractor identifies and implements initiatives to promote and maintain the health and wellbeing of all site operatives within the development footprint. This can be via site facilities, site management arrangements, staff policies etc.	

j	Establish management practices and facilities encouraging equality, fair treatment and respect of all site operatives.	Yes
k	Provide secure, clean and organised facilities (e.g., changing and storage facilities) for site operatives within the development footprint.	
<b>Security Processes</b>		
l	Minimise risks of the site becoming a focus for antisocial behaviour in the local community (e.g., robust perimeter fencing, CCTV, avoid creating dark corners etc.).	
<b>Training, awareness and feedback</b>		
The principal contractor is responsible for ensuring:		
m	Aspects of the construction process that might impact the community are communicated regularly, ensuring that nuisance and intrusion are minimized.	
n	Ensure ongoing training is provided, and up to date, for personnel and visitors (covering items a to l, as appropriate.)	Yes
o	The principal contractor ensures that site operatives are trained for the tasks they are undertaking (including any site-specific considerations).	Yes
p	The fleet operators undertake driver training and awareness to promote safety within the development footprint and off site.	
<b>Monitoring and reporting</b>		
The principal contractor ensures:		
q	The fleet operators, captures and investigates any road accidents, incidents and near misses and reports them back to the principal contractor. The principal contractor analyses these items.	
r	All visitor, workforce and community accidents, incidents and near misses are recorded and action is taken to reduce the likelihood of them reoccurring.	Yes
s	Processes are in place to facilitate collecting and recording feedback from the community and to address any concerns related to the development footprint.	

The main contractor can register with and achieve formal certification under the Considerate Constructors Scheme (CCS). The CCS monitor's report can be used as evidence to demonstrate that the relevant items in the criteria have been achieved, as follows:

- A CCS score of  $\geq 25 < 35$  (items d and j)
- A CCS score of  $\geq 35$ , with at least 7 in each of the five sections (items a, d, f, h, j, n, o and r).

## **Utility Consumption**

### Energy and Water Consumption

Monthly measurements of energy consumption per fuel type (kWh) from the use of construction plant, equipment (mobile and fixed) and site accommodation shall be recorded and displayed on site. The total energy consumption must be reported per fuel type (total kWh and kWh/£100k project value) and carbon dioxide emissions (total kgCO<sub>2</sub>eq, and kgCO<sub>2</sub>eq/£100k project value).

Monthly measurements of water consumption (m<sup>3</sup>) from the use of construction plant, equipment (mobile and fixed) and site accommodation shall be recorded and displayed on site. The total net water consumption must be reported, minus any recycled water use.

Appropriate target levels of monthly energy and water consumption are set. These should be set using 'Constructing Excellence' KPI benchmarks.

As a minimum monitoring will include checking the meters and displaying some form of graphical analysis in the site office to show consumption over the project duration and how actual consumption compares to the targets set.

The design/site management team will nominate an individual who will be responsible for the monitoring and collection of data throughout the build programme.

The data must be produced in an acceptable format for the BREEAM assessor to include within the BREEAM scoring and reporting tool.

### Transport of Construction Materials and Waste

Transport movements and impacts resulting from the delivery of construction materials from the factory gate to the building site, including any transport, intermediate storage and distribution are recorded at least monthly during the entire construction period.

The monitoring must cover the materials used in major building elements (i.e., those defined in BREEAM issue Mat 01 Environmental Impacts from Construction Products – Building Life Cycle Assessment (LCA)), including insulation materials, and ground works and landscaping materials.

Transport movements and impacts resulting from the removal of construction waste from the construction gate to waste disposal processing/recovery centre gate are recorded at least monthly during the entire construction period.

The monitoring must cover the construction waste groups outlined in the project's waste management plan.

The following information must be reported separately for both materials and waste and provided in an acceptable format for the BREEAM assessor to include within the BREEAM scoring and reporting tool:

- Total number of deliveries
- Total distance travelled for all deliveries (km)
- Total energy consumption (litres of fuel) from all deliveries
- Total greenhouse gas emissions (kgCO<sub>2eq</sub>) from all deliveries

#### **9.1.1.2 MAN 04: Commissioning and Handover**

##### **Commissioning and Testing Schedule and Responsibilities**

The main contractor shall produce a schedule of commissioning that identifies and includes a suitable timescale for commissioning and re-commissioning of all complex and non-complex building services and control systems and testing and inspecting fabric.

The schedule will identify the appropriate standards that all commissioning activities will be conducted in accordance with, such as current Building Regulations, BSRIA and CIBSE guidelines and/or other appropriate standards, where applicable.

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.

Where a Building Management System (BMS) is specified, the following commissioning procedures shall be carried out:

1. Commissioning of air and water systems when all control devices are installed, wired and functional;
2. Include physical measurements of room temperatures, off coil temperatures and other key parameters as appropriate;
3. The BMS/controls installation should be running in auto with satisfactory internal conditions prior to handover;
4. All BMS schematics and graphics are fully installed and functional to user interface before handover.

5. The occupier or facilities team is fully trained in the operation of the system.

A commissioning manager shall be appointed to monitor and programme pre-commissioning, commissioning and, where necessary, re-commissioning. The commissioning manager can be a person from the contractor or sub-contractor organisation provided they are not involved in the general installation works.

All building services shall be included in the commissioning schedule and commissioning shall be accounted for within the budget and main programme of works, allowing for the required time to complete all commissioning and testing activities prior to handover.

### **Commissioning Building Services**

The main contractor shall appoint a specialist commissioning manager for complex systems such as:

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

The scope of their responsibility shall include:

- a. Undertaking design reviews and giving advice on suitability for ease of commissioning;
- b. Providing commissioning managing input to construction programming and during installation stages;
- c. Management of commissioning, performance testing and handover/post-handover stages.

The commissioning manager is responsible for witnessing the commissioning of the complex systems.

### **Testing and Inspecting Building Fabric**

The main contractor shall carry out 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, through airtightness testing and a thermographic survey.

Surveys shall be carried out by a suitably qualified professional in accordance with the appropriate standards, as follows:

1. 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.
2. 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

Any defects identified during post-construction testing and inspection prior to building handover and close out are rectified to meet the required performance characteristics for the building or element as defined at the design stage.

## **Handover**

### Building User Information

The main contractor shall produce two Building User Guides for the following users:

1. A non-technical user guide for distribution to the building occupiers
2. A technical user guide for the premises facilities managers.

The building user guides shall be building-specific or site-specific guidance. The purpose of the guides is to help building users access, understand and operate the building efficiently and in accordance with the original design intent. The content of the guides is specific to the building type and end users, 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 transportation 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 non-technical building user guide for building occupiers:

- 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 technical building user guide for facilities managers:

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

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

#### Training Schedule

The main contractor shall produce two training schedules times appropriately around handover and proposed occupation plans for the following users:

- a. A non-technical training schedule for the building occupiers
- b. A technical training schedule for the premises facilities managers.

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 non-technical building user guide for building occupiers and other relevant building documentation.

Additionally, for the facilities managers' training schedule:

- The available aftercare provision and aftercare team main contacts, including any scheduled commissioning and post occupancy evaluation
- Introduction to, and demonstration of, installed systems and key features, particularly building management systems, controls and their interfaces
- Introduction to the technical building user guide facilities managers' 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.

### 9.1.1.3 MAN 05: Aftercare

#### **Aftercare Support**

The main contractor shall provide aftercare support to all building occupiers, which includes the following as a minimum:

- 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:
  - i. Introduce the aftercare support available, including the content of the Building User Guide (where existing) and training schedule
  - ii. Present key information about features of the building including the design intent and how to use the building to ensure it operates efficiently and effectively as possible.
- b. Onsite facilities management training including:
  - i. A walkabout of the building, and;
  - 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;
- c. Initial aftercare support for at least the first month of building occupation e.g., weekly attendance on site attendance to support building users and management (the level of frequency will depend on the complexity of the building and building operations)
- d. 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.

The main contractor shall allow for 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 the actual and predicted performance, with a view to adjusting systems and user behaviours accordingly.

#### **Commissioning – Implementation**

The following seasonal commissioning responsibilities shall be completed over a minimum 12-month period, once the building becomes substantially occupied:

##### Complex systems – Specialist Commissioning Manager

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

- b. Test all building services under full load conditions, i.e., heating equipment in mid-winter, cooling/ventilation equipment in mid-summer, and under part load conditions (spring/autumn);
- c. Where applicable, carry out testing during periods of extreme (high or low) occupancy
- d. Interview building occupants (where they are affected by the complex services) to identify problems or concerns regarding the effectiveness of the systems
- e. Produce monthly reports comparing sub-metered energy to the predicted one (see Ene 01 Reduction of Energy User and Carbon Emissions)
- f. Identify inefficiencies and areas in need of improvement
- g. 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.

Simple systems (naturally ventilated) – external consultant/aftercare team/facilities manager

- a. Review thermal comfort, ventilation, and lighting, at three-, six- and nine-month intervals after initial occupation, either by measurement or occupant feedback
- b. Identify deficiencies and areas in need of improvement
- c. Re-commission systems and incorporate any relevant revisions in operating procedures into the O&M manuals.

## **9.1.2 HEALTH AND WELLBEING**

### **9.1.2.1 HEA 01: Visual Comfort**

The main contractor shall install a compliant glare control strategy to negate the potential for glare in all relevant building areas.

The glare control strategy shall not increase energy consumption used for lighting by maximising daylight in all weather conditions (cloudy or sunny), and ensuring the use or location of shading does not conflict with the operation of lighting control systems.

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 a combination of the above.

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

**9.1.2.2 HEA 02: Indoor Air Quality**

**Indoor Air Quality Plan**

The main contractor shall ensure implementation of an Indoor Air Quality (IAQ) plan, which considers:

- a. Removal of contaminant sources
- b. Dilution and control of contaminant sources:
  - i. Where present, consideration is given to the air quality requirements of specialist areas such as laboratories
- c. Procedures for pre-occupancy flush out
- d. Third party testing and analysis
- e. Maintaining good indoor air quality in use.

**Emissions from Construction Products**

The main contractor shall ensure that all of the product types listed in the table below meet the emission limits, testing requirements and any additional requirements.

Where wood-based products are not one of three selected product types, all wood-based products used for internal fixtures and fittings must be tested and classified as formaldehyde E1 class as a minimum.

The main contractor shall obtain confirmation from the manufacturer(s) to demonstrate compliance.

Emission limit			Testing requirement	Additional requirements
Formaldehyde	Total volatile organic compounds (TVOCs)	Category 1A and 1B carcinogens		
<b>Interior paints and coatings</b>				
≤ 0.06 mg/m <sup>3</sup>	≤ 1.0 mg/m <sup>3</sup>	≤ 0.001 mg/m <sup>3</sup>	EN 16402 or ISO 16000-9 or	Meet TVOC content limits. Paints used in wet areas (e.g., bathrooms, kitchens, utility rooms) should

			EN 16516 or CDPH Standard Method v1.1	protect against mould growth.
<b>Wood based products (including wood flooring)</b>				
≤ 0.06 mg/m <sup>3</sup> (non-MDF) ≤ 0.08 mg/m <sup>3</sup> (MDF)	≤ 1.0 mg/m <sup>3</sup>	≤ 0.001 mg/m <sup>3</sup>	ISO 16000-9 or EN 16516 or CDPH Standard Method v1.1 or EN 717-1 (formaldehyde emissions only)	n/a
<b>Flooring materials (including floor levelling compounds and resin flooring)</b>				
≤ 0.06 mg/m <sup>3</sup>	≤ 1.0 mg/m <sup>3</sup>	≤ 0.001 mg/m <sup>3</sup>	ISO 10580 or ISO 16000-9 or EN 16516 or CDPH Standard Method v1.1	n/a
<b>Ceiling, wall and acoustic and thermal insulation materials</b>				
≤ 0.06 mg/m <sup>3</sup>	≤ 1.0 mg/m <sup>3</sup>	≤ 0.001 mg/m <sup>3</sup>	ISO 16000-9 or EN 16516 or CDPH Standard Method v1.1	n/a
<b>Interior adhesives and sealants (including flooring adhesives)</b>				
≤ 0.06 mg/m <sup>3</sup>	≤ 1.0 mg/m <sup>3</sup>	≤ 0.001 mg/m <sup>3</sup>	EN 13999 (Parts 1-4) <sup>9</sup> or ISO 16000-9	n/a

			or EN 16516 or CDPH Standard Method v1.1	
<p>^ The emission limits in this table apply to the finished product, i.e., after any coating or other treatment process has been applied.</p> <p>* 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.</p> <p># 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 <math>\leq 1</math> after 28 days.</p>				

### Post Construction Indoor Air Quality Measurements

The main contractor shall allow for a programme of post construction (but pre-occupancy) testing to measure the formaldehyde concentration in indoor air (not exceed  $100\mu\text{g}/\text{m}^3$  averaged over 30 minutes) to ensure compliance with the required levels and standards.

The formaldehyde sampling and analysis is performed in accordance with ISO 16000-2 and ISO 16000-3.

The total volatile organic compound (TVOC) concentration in indoor air is measured post construction (but pre-occupancy) and does not exceed  $500\mu\text{g}/\text{m}^3$  over 8 hours.

The TVOC sampling and analysis is performed in accordance with ISO 16000-5 and ISO 16000-6 or ISO 16017-1.

Where levels are found to exceed these limits, the main contractor must take measures in accordance with the IAQ Plan to reduce the TVOC and formaldehyde levels to within the limits prescribed.

#### 9.1.2.3 HEA 05: Acoustic Performance

The main contractor shall allow for a programme of pre-completion acoustic testing to be carried out by a compliant test body in accordance with the acoustic testing and measurement procedures outlined in the Methodology below, to ensure that the relevant spaces (as built) achieve the required

performance standards for sound insulation, indoor ambient noise levels and room acoustics, as follows:

#### Sound Insulation

The sound insulation between rooms and other occupied areas complies with the performance criteria given in Section 7 of BS 8233:2014. Alternatively, propose performance standard based on demonstrably best practice.

#### Indoor Ambient Noise Levels

Achieve indoor ambient noise levels that comply with the design ranges given in Section 7 of BS 8233:2014.

#### Room Acoustics

Achieve the requirements relating to sound absorption and reverberation times, where applicable, set out in Section 7 of BS 8233:2014.

For spaces where the acoustic environment is controlled through the use of defined amounts of sound absorption, installation of a specification compliant with the BS 8233:2014 criteria demonstrate compliance. A site inspection by the developer or SQA is required to confirm that a compliant specification has been installed.

#### **Testing, measurement and calculation procedures**

Where specific guidance on number of testing locations, measurement methods and calculation are not stated in the criteria above, or within the relevant standard or guidance referenced, the following procedures can be followed by the acoustician when measuring or calculating the levels required to demonstrate compliance with this BREEAM issue.

Measurements of sound insulation (airborne and impact) should be made in accordance with the relevant part of BS EN ISO 16283(92) series, or the successor to these standards. Measurements should be conducted between one in four pairs of adjacent rooms (or teaching spaces) of each room type or performance requirements category and construction type. Measurements of reverberation time should be made in accordance with the engineering grade (or better) requirements of BS EN ISO 3382-2:2008(93) and conducted within one in four rooms (or teaching spaces) of each room type of performance requirement category and construction type.

For measurements of ambient noise, when no specific guidance is available, the following procedures should be used:

1. Noise from both internal sources (e.g., mechanical ventilation systems, plant noise, noise-making systems) and external sources (e.g., traffic noise transmitted via the building façade) should be included. Also, where windows are openable as part of the ventilation strategy, these should be assumed to be open for the purposes of calculations and measurements. If openable windows are present but do not form part of the background or permanent ventilation strategy, then these should be assumed to be closed for the purposes of calculations and measurements.
2. Noise from occupants and office equipment (e.g., computers) should not be included in the measurements.
3. Unless otherwise stated in the 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 should be conducted in rooms utilising each strategy. Otherwise, measurements should 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.

Where testing identifies that spaces do not meet the standards, remedial works are carried out 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 previously untested of a similar construction and performance requirement.

#### **9.1.2.4 HEA 07: Safety and Healthy Surroundings**

The main contractor shall ensure the implementation of the provision of an outside space providing building users with an external amenity area.

The main contractor should provide design drawings demonstrating the access arrangements from the site entrance to the cycle storage facilities and main building entrance, and delivery area layout providing parking and turning areas for simple manoeuvring and dedicated parking or waiting areas for goods vehicles

#### **9.1.3 ENERGY**

##### **9.1.3.1 Ene 01: Reduction of Energy Use and Carbon Emissions**

Building energy modelling shall be compliant with the National Calculation Method (NCM) and carried out by an Accredited Energy Assessor using approved building energy calculation software to produce a Building Regulation Output document, resulting in a performance improvement better than the notional building level (as defined by the 2013 version of the Building Regulations, Part L2a).

Note that the BRUKL and EPC certificate shall confirm achievement of 3 No. BREEAM credits which are targeted. The Main Contractor shall ensure that the energy modelling and subsequent final BRUKL and EPC certificates achieve the equivalent, or better, of the 3 No. credits allocated.

A copy of the Building Regulations Output document from the approved software reflecting the 'As built' stage of analysis shall be provided.

##### **9.1.3.2 ENE 02: Energy Monitoring**

The main contractor shall ensure that each energy sub-meter is labelled with the end consuming use prior to the assessor's final site inspection. Meters must be installed on the energy supply to each separate tenanted unit or floor plate within the assessed development [offices, operational areas and ancillary areas such as canteens].

### 9.1.3.3 ENE 04: Low Carbon Design

#### Passive Design

The main contractor shall ensure the passive design measures recommended in the passive design analysis shall be installed on site in order to achieve a reduction in the total heating, cooling, mechanical ventilation, lighting loads and energy consumption.

#### Low and Zero Carbon Technologies

The main contractor shall ensure the low and zero carbon technologies recommended in the LZC feasibility study are installed on site in order to achieve a reduction in regulated CO<sub>2</sub> emissions.

### 9.1.3.4 ENE 06: Energy Efficient Transportation Systems

#### Energy Consumption

The main contractor shall carry out an analysis of the transportation demand and usage patterns for the building to determine the optimum number and size of lift(s) required, including counterbalancing ratio.

The energy consumption shall be calculated in accordance with BS EN ISO 25745 Part 2 or Part 3 for one of the following:

- i. At least two options for each transportation type (e.g., for lifts, hydraulic, traction or machine room-less (MRL)), OR;
- ii. At least two options considering different system arrangements and control strategies.

The use of regenerative drives should be considered, and the lift strategy with the lowest energy consumption shall be specified.

#### Energy Efficient Features

For each lift the following three energy efficient features shall be specified:

- a. A standby condition for off-peak periods
- 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
- c. Use of a drive controller capable of variable speed, variable-voltage, and variable-frequency (VVVF) control of the drive motor.

Where the use of regenerative drives is demonstrated to save energy, they are specified.

**9.1.4 TRANSPORT**

**9.1.4.1 TRA 01: Transport Assessment and Travel Plan**

The main contractor shall implement and install any physical recommendations outlined in the Travel Plan.

**9.1.4.2 TRA 02: Sustainable Transport Measures**

The main contractor shall implement the sustainable public, private and active transport measures identified during the design stage, in accordance with the table below (as minimum assessment options 3, 4, 7, 8, and 17 (outside space)).

Sustainable transport measures	
Assessment option	Public transport measures
1	1. The existing AI calculated in Tra 01 achieves the following: <ul style="list-style-type: none"> <li>• <math>\geq 4</math> for prison or MOD sites, rural location sensitive buildings, and other building group 3</li> <li><math>\geq 8</math> for all other building types.</li> </ul>
2	2. Demonstrate an increase over the existing Accessibility Index through negotiation with local bus, train or tram companies to increase the frequency of the local service provision for the development;
	OR
	3. Demonstrate an increase over the existing Accessibility Index. This could be through provision of a diverted bus route, a new or enhanced bus stop, or other similar solutions;
3	OR
	4. Provide a dedicated service, such as a bus route or service.
3	5. Provide a public transport information system in a publicly accessible area, to allow building users access to up-to-date information on the available public transport and transport infrastructure. This may include signposting to public transport, cycling, walking infrastructure or local amenities.
Assessment option	Private transport measures
4	6. Provide electric recharging stations of a minimum of 3kW for at least 10% of the total car parking capacity for the development.

5	<p>7. Set up a car sharing group or facility to facilitate and encourage building users to car share.</p> <p>8. Raise awareness of the sharing scheme with marketing and communication materials.</p> <p>9. Provide priority spaces for car sharers for at least 5% of the total car parking capacity for the development.</p> <p>10. Locate priority parking spaces nearest the development entrance used by the sharing scheme participants.</p>
<b>Assessment option</b>	<b>Active travel measures</b>
6	<p>11. During preparation of the brief, the design team consults with the local authority (LA) on the state of the local cycling network and public accessible pedestrian routes, to focus on whichever the LA deems most relevant to the project, and how to improve it.</p> <p>12. 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 impact on the local cycling network or on pedestrian routes open to the public.</p>
7	13. Install compliant cycle storage spaces to meet the minimum levels set out in Table 7.5 of the BREEAM NC 2018 scheme guidance.
8	<p>14. Option 7 has been achieved.</p> <p>15. Provide at least two compliant cyclists' facilities for the building users, (including pupils where appropriate to the building type) for the scope of each compliant facility:</p> <ul style="list-style-type: none"> <li>• Showers</li> <li>• Changing facilities</li> <li>• Lockers</li> <li>• Drying spaces.</li> </ul>
9	<p><b>Existing amenities:</b></p> <p>16. At least three existing accessible amenities are present, see Table 7.6 of the BREEAM NC 2018 scheme guidance, where relevant for a Building Group.</p>
10	<p><b>Enhanced amenities:</b></p> <p>17. Ensure a minimum of one new accessible amenity, in accordance with Table 7.6 of the BREEAM NC 2018 scheme guidance, for the relevant Building Group, is provided.</p> <p>OR</p>

	18. Ensure more than one new accessible amenity, in accordance with Table 7.6 of the BREEAM NC 2018 scheme guidance for the relevant Building Group, is provided.
<b>Assessment option</b>	<b>Alternative transport measures</b>
11	19. Implement one site-specific improvement measure, not covered by the options already listed in this issue, in line with the recommendations of the travel plan. Submit this for review by BRE.

### 9.1.5 WATER

#### 9.1.5.1 WAT 01: Water Consumption

The main contractor shall ensure the installation of low water consuming sanitary ware to ensure at least a 40% improvement on potable water consumption (litres/person/day).

The efficiency of the following ‘domestic scale’ water consuming components shall be accounted for:

- WC’s
- Urinals
- Taps (wash hand basins, kitchen taps and pre-rinse nozzles)
- Showers
- Dishwashers

Water consumption figures shall be collected from manufacturers’ product information to determine the consumption of each type and specification of domestic and commercial scale water consuming component required, as follows:

- WCs: actual maximum or, where dual flush, effective flush volume in litres/use
- Urinals: flush volume in litres/use for single use flush urinals. For cistern fed systems, the flushing frequency/hour and cistern capacity in litres
- 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  $3 \pm 0.2$  bar ( $0.3 \pm 0.02$  MPa)
  - OR
  - For low pressure (Type 2) taps  $0.1 \pm 0.02$  bar ( $0.01 \pm 0.002$  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
- Kitchen taps: maximum flow rate litres/min
- Showers: flow rate of each shower at the outlet using cold water (T 30°C), in litres per minute measured at a dynamic pressure:

- $3 \pm 0.2$  bar ( $0.3 \pm 0.02$  MPa) for high pressure (Type 1) supply systems  
OR
- $0.1 \pm 0.05$  bar ( $0.01 \pm 0.005$  MPa) for low pressure (Type 2) supply systems (BS EN 1112:2008)
- Dishwashers: litres/cycle for domestic applications and/or appliances or litres/rack for commercial applications or appliances.

The following maximum consumption levels for each sanitary fitting are provided by BREEAM as a guide:

- WC's – maximum effective flush volume of 3.75 litre
- Urinals – 1.5 litres/bowl/hour (2 or more urinals)
- Wash hand basin taps – 5 litres/min
- Kitchen tap – 6 litres/min (kitchenette), or 6 litres/min (pre-rinse nozzles only)
- Showers – 6 litres/min
- Dishwashers – 12 litres/cycle (domestic sized).

However, to ensure that the component specification achieves the targeted number of BREEAM credits, it is recommended that the performance of a particular building's component specification is verified using the BREEAM Wat 01 calculator before committing to that particular specification.

#### **9.1.5.2 WAT 02: Water Monitoring**

The main contractor shall ensure the installation of a water meter on the mains incoming supply to the building. The water meter(s) shall have a pulsed output to enable connection to a BMS (or future connection) for the monitoring of water consumption.

Any water consuming plant or building areas consuming 10% or more of the building's total water demand shall be fitted with water sub-meters.

#### **9.1.5.3 WAT 03: Water Leak Detection**

##### **Leak Detection System**

A leak detection system shall be installed which is capable of detecting a major water leak on the utilities water supply within the building, and between the buildings and the utilities water supply to detect any major leaks between the utilities supply and the buildings under assessment.

The leak detection system must be:

- 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

- b. Activated when the flow of water passing through the water meter/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
- c. Able to identify different flow and therefore leakage rates, e.g., continuous, high and/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
- d. Programmable to suit the owner/occupiers' water consumption criteria
- e. Where applicable, designed to avoid false alarms caused by normal operation of large water-consuming plant such as chillers.

### **Flow Control Devices**

In addition, the main contractor shall ensure the installation of flow control devices that regulate the water supply to each WC area or sanitary facility according to demand, in order to minimise undetected wastage and leaks from sanitary fittings and supply pipework.

## **9.1.6 MATERIALS**

### **9.1.6.1 MAT 03: Responsible Sourcing of Construction Products**

#### **Legally Harvested and Traded Timber**

The main contractor shall procure 'Legally harvested and traded timber' during construction, including formwork, site hoardings and other temporary site timber used for the purpose of facilitating construction.

BREEAM follows the UK Government's definition of legally sourced timber, as outlined in the Central Point of Expertise on Timber (CPET) 5<sup>th</sup> Edition report on the UK Government's Timber Procurement Policy (TPP). The policy requires all timber and wood-based products to be covered by at least one of the following:

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

For the avoidance of doubt, 100% of the timber and timber-based products must be compliant. Manufacturer's details and timber certification shall be provided in order to demonstrate compliance.

Further information in the UK Government's Timber Procurement Policy and compliant responsible sourcing certification schemes is available from the CPET (Central Point of Expertise on Timber) website: [www.cpet.org.uk/](http://www.cpet.org.uk/)

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.

### **Enabling Sustainable Procurement**

The main contractor shall source materials for the project in accordance with a documented sustainable procurement plan.

The sustainable procurement plan shall set out a clear framework for the responsible sourcing of materials to guide the specification and procurement of construction materials throughout the project. The plan shall be prepared at either organisational level or be site/project specific for the purpose of the BREEAM assessment, and shall cover the following as a minimum:

- a. Include sustainability aims, objectives and strategic targets to guide procurement activities.  
Note: targets do not need to be achieved for the credit to be awarded but justification must be provided for targets that are not achieved
- b. Include a requirement for assessing the potential to procure construction products locally.  
There must be a policy to procure construction products locally where possible
- c. 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 organizational level it must:

- d. Identify the risks and opportunities of procurement against a broad range of social, environmental and economic issues following the process set out in BS ISO 20400:2017.

### **Responsible Sourcing of Materials**

In order to fulfil the requirements of BREEAM for the project, the main contractor will ensure that the materials in the following building elements will be procured from 'responsible' sources where possible:

1. Superstructure (frame, upper floors, roof, stairs and ramps, external walls, windows and external doors, internal walls and partitions)
2. Internal finishes (wall finishes, floor finishes, ceiling finishes)
3. Substructure and hard landscaping (substructure, roads, paths and pavings)
4. Core building services (heat source, space heating and air-conditioning, ventilation, fuel installations and systems).

All applicable materials shall be covered by appropriate and compliant BREEAM recognised environmental management or Responsible Sourcing Certification (RSC) Schemes that have as a minimum demonstrated compliance with the mandatory requirements and evaluation criteria as defined by BREEAM.

For materials that demonstrate responsible sourcing, the following certification schemes comply with BREEAM:

- BRE Global, BES 6001 – Framework Standard for Responsible Sourcing
- CARES Sustainable Construction Steel (SCS) Scheme
- Concrete Sustainability Council (CSC)
- Eco Reinforcement Responsible Sourcing Standard, Steel Products for the Reinforcement of Concrete
- Forest Stewardship Council (FSC)
- Programme for the Endorsement of Forest Certification (PEFC)
- Sustainable Forestry Initiative (SFI)
- Environmental Management Systems (EMS) (i.e., ISO 14001).

#### **9.1.6.2 MAT 05: Designing for Durability and Resilience**

##### **Protecting Vulnerable Parts of the Building from Damage**

The main contractor shall ensure that all durability measures outlined in the design, both externally and internally, are installed.

Compliant durability measures include:

- Bollards, barriers, or raised kerbs to delivery and vehicle drop-off areas
- Robust external wall construction, up to 2m high
- Corridor walls specified to Severe Duty (SD) as per BS 5234-2, and, for healthcare buildings, Health Technical Memorandum 56 - Partitions
- Protection rails to walls of corridors
- Kick plates or impact protection (e.g., from trolleys etc.) on doors

- Hard-wearing and easily washable floor finishes in heavily used circulation areas (i.e., main entrance, corridors, public areas, etc.)
- Door stoppers to prevent door handles damaging doors
- Designing out the risk without the need for additional materials specification to protect vulnerable areas.

**Protecting Exposed Parts of the Building from Material Degradation**

The main contractor shall ensure that all protection measures outlined in the design, to limit material degradation due to environmental factors, are installed.

Relevant industry durability or quality standards and design guides are outlined in the table below. Where an appropriate quality or durability standard or design guide is not available, BS 7543:2015 shall be used as the default appropriate standard.

<b>Relevant industry durability or quality standards and design guides</b>
<b>Timber</b>
<p>BS EN 350:2016. Durability of wood and wood-based products - Testing and classification of the durability to biological agents of wood and wood-based materials, BSI; 2016.</p> <p>WIS 4-28. Durability by design, TRADA; 2016</p> <p>WIS 2/3-60. Specifying timber exposed to weathering, TRADA; 2015</p> <p>WIS 1-47. Timber external doors, TRADA; 2015</p> <p>BS 8605-1:2014. External timber cladding - Method of specifying, BSI; 2014</p>
<b>Curtain walling</b>
<p>Standard for systemized building envelopes, Centre for Window and Cladding Technology; 2006</p> <p>CWCT Curtain Wall Installation Handbook, Centre for Window and Cladding Technology; 2006</p> <p>BS EN 13830:2015. Curtain walling - Product standard, BSI; 2015</p>
<b>Brickwork, blockwork</b>
<p>BDA Design Note 7 - Brickwork durability, Brick Development Association; 2011</p> <p>Severely Exposed Brickwork, Brick Development Association; 2014</p> <p>BS 8297-2017. (Design, manufacture and installation of architectural precast concrete cladding. Code of practice).</p> <p>The standard refers to EN 13369 (Common Rules for precast concrete products) on durability requirements and requires concrete cover to be in accordance to EN 1992-1-1 and BS 8500.</p> <p>BS 8500-1:2015 +A1:2016. Concrete – complementary British Standard to BS EN 2016 part 1: Method of specifying and guidance for the specifier and</p>

BS 8500-2:2015 +A1:2016. Concrete – complementary British Standard to BS EN 2016 part 2: Specification for constituent materials and concrete.

**Roof elements**

BR 504. Roofs and roofing: Performance, diagnosis, maintenance, repair and the avoidance of defects (Third Edition), BRE; 2009

Profiled sheet roofing and cladding. The guide to design and best practice (4th edition), National Federation of Roofing Contractors; 2016

Guidelines for the Design & Application of Green Roof Systems, CIBSE; 2013

Single Ply: Design Guide 2016 Edition, Single Ply Roofing Association; 2016

SPRA: Guidance and standards

LRWA: technical guidance notes

**Metal cladding**

Profiled sheet roofing and cladding. The guide to design and best practice (4th edition) National Federation of Roofing Contractors 2016

Metal Fabrications: Design, Detailing and Installation Guide, Metal Cladding and Roofing Manufacturers Association; 2006

**Glazing**

BS EN 12488:2016. Glass in building - Glazing recommendations - Assembly principles for vertical and sloping glazing, BSI; 2016

**Masonry**

PD 6697:2010. Recommendations for the design of masonry structures to BS EN 1996-1-1 and BS EN 1996-2, BSI; 2010

BS EN 1996-2:2006. Eurocode 6. Design of masonry structures. Design considerations, selection of materials and execution of masonry, BSI; 2006

**Other useful standards or design guides**

BR 292. Cracking in buildings (Second edition), BRE; 2016

BRE Good Practice guidance's

### 9.1.6.3 MAT 06: Material Efficiency

#### Material Efficiency

The main contractor shall provide details of targets, opportunities and methods reported during each RIBA Stage (1-5) to optimise the use of materials, following the material efficiency strategy outlined in Table 9.15 of the BREEAM NC 2018 scheme guidance.

Details of material efficiency measures implemented during the Developed Design (RIBA Stage 3), Technical Design (RIBA Stage 4) and Construction (RIBA Stage 5).

Details of the targets and actual material efficiencies achieved will be provided.

### 9.1.7 WASTE

#### 9.1.7.1 WST 01: Construction Waste Management

##### Pre-demolition Audit

A pre-demolition audit of any existing buildings, structures or hard surfaces being considered for Demolition (carried out at Concept Design stage (RIBA Stage 2)) must be referenced in the resource management plan (RMP), to maximise the recovery of material for subsequent high grade or value applications.

The audit shall cover the following:

1. Identification and quantification of the key materials where present on the project (see below for construction waste groups)
2. Potential applications and any related issues for the reuse and recycling of the key materials in accordance with the waste hierarchy
3. Opportunities for reuse and recycling within the same development
4. Identification of local re-processors or recyclers for recycling of materials
5. Identification of overall recycling targets where appropriate
6. Identification of reuse targets where appropriate
7. Identification of overall landfill diversion rate for all key materials.

The pre-demolition audit shall guide the design, consider materials for reuse and set targets for waste management as well as engage all contractors in the process of maximising high grade reuse and recycling opportunities.

The main contractor shall compare actual waste arisings and waste management routes used with those forecast and investigate significant deviations from planned targets.

### **Construction Resource Efficiency**

A Resource Management Plan (RMP) shall be developed covering the non-hazardous waste materials (from on-site construction and dedicated off-site manufacture or fabrication), including demolition and excavation waste, which covers the following:

1. The target benchmark for resource efficiency ( $\text{m}^3$  of waste per  $100\text{m}^2$  or tonnes of waste per  $100\text{m}^2$ )
2. Procedures and commitments for minimising non-hazardous waste in line with the benchmark
3. Procedures for minimising hazardous waste
4. A waste-minimization target and details of waste minimization 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 a PAS402 compliant 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.

The main contractor shall ensure that the amount of non-hazardous construction waste generated by the building's construction phase (excluding demolition and excavation waste) does not exceed 6.5tonnes, or  $7.5\text{m}^3$  per  $100\text{m}^2$  of the gross internal floor area.

### **Diversion of Resources from Landfill**

At least 80% (by weight) or 70% (by volume) of non-hazardous waste shall be diverted 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 the material to the supplier via a ‘take-back’ scheme;
- 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).

Waste materials will be sorted into separate key waste groups (according to the waste streams generated by the scope of the works) either onsite or offsite through a licensed contractor for recovery.

The following table lists the compliant construction waste groups:

European Waste Catalogue	Key Group	Examples
170102	Bricks	Bricks
170101	Concrete	Pipes, kerb stones, paving slabs, concrete rubble, precast and in situ
170604	Insulation	Glass fibre, mineral wool, foamed plastic
1501	Packaging	Paint pots, pallets, cardboard, cable drums, wrapping bands, polythene sheets
170201	Timber	Softwood, hardwood, boards products such as plywood, chipboard, medium density fibreboard (MDF)
1602	Electrical and electronic equipment	Electrical & electronic TVs, fridges, air-conditioning units, lamps equipment
1301	Oils	Hydraulic oil, engine oil, lubricating oil
1703	Asphalt and tar	Bitumen, coal tars, asphalt
170103	Tiles and ceramics	Ceramic tiles, clay roof tiles, ceramic sanitary ware
1701	Inert	Mixed rubble/excavation material, glass
1704	Metals	Radiators, cables, wires, bars, sheet
170802	Gypsum	Plasterboard, render, plaster, cement, fibre cement sheets

170203	Plastics	Pipes, cladding, frames, non-packaging sheet
1705	Soils	Soils, clays, sand, gravel, natural stone
Most relevant EWC	Liquids	Non-hazardous paints, thinners, timber treatments
Most relevant EWC	Hazardous	Defined in the Hazardous Waste List (HWL) of the European Waste Catalogue (EWC)
Most relevant EWC	Floor coverings (soft)	Carpets, vinyl flooring
Most relevant EWC	Architectural Features	Roof tiles, reclaimed bricks, fireplaces
170904 (Mixed)	Mixed/other	Efforts should be made to categorise waste into the above categories where possible

### 9.1.7.2 WST 03: Operational Waste

The main contractor shall install a dedicated recyclable waste storage area that is sized appropriately based on the estimated recyclable waste streams and volumes generated by the proposed building.

This shall be in addition to the general waste storage area.

Both the general and recyclable waste storage areas must be clearly labelled, of capacity appropriate to the building type, size, and predicted volumes of waste that will arise from daily/weekly operational activities and occupancy rates and accessible to all building occupants/facilities operators.

The recyclable waste storage area must be a minimum of 2m<sup>2</sup> per every 1000m<sup>2</sup> for buildings <5000m<sup>2</sup> net floor area.

Where the development is likely to produce a consistent generation in volume of operational waste streams such as large amounts of packaging and/or compostable waste, the main contractor shall also install a static waste compactor(s) or baler(s) and/or vessel for composting suitable organic waste.

Where organic waste is to be stored/composted on site, a water outlet shall be installed adjacent to or within the facility for cleaning and hygiene purposes.

### **9.1.8 LAND USE AND ECOLOGY**

#### **9.1.8.1 LE 03: Managing Negative Impacts on Ecology**

##### **Planning, Liaison, Implementation and Data**

The main contractor shall provide details of defined roles and responsibilities for managing negative impacts on the ecology at an early enough stage to influence the Preparation and Brief (RIBA Stage 1) or Concept Design (RIBA Stage 2).

Details of the potential impact of site preparation and construction works on ecology at an early project stage, and details of the proposed solutions and selected measures to be implemented during site preparation and construction works through liaison with representative stakeholders.

##### **Managing Negative Impacts of the Project**

The main contractor shall ensure that negative impacts from site preparation and construction works have been managed according to the BREEAM hierarchy below, and the loss of ecological value has been minimised.

Hierarchy for managing negative impacts on site:

The following hierarchy must be followed when managing negative impacts of the site preparation and construction works:

1. Avoidance of negative impacts of habitats and features of ecological value on the site
2. If it is not possible for avoidance of negative impacts, protect habitats and features of ecological value from damage in accordance with best practice guidelines during development works
3. If it is not possible for avoidance of all negative impacts or to protect habitats and features of ecological value, reduce, limit or control negative impacts as far as possible
4. Where it is not possible for avoidance, protection, limitation or control of the negative impacts on features of ecological value on site, compensation has taken place to ensure the existing ecological value is maintained during and after the project.

#### **9.1.8.2 LE 04: Change and Enhancement of Ecological Value**

##### **Change and Enhancement of Ecology**

The main contractor shall ensure that planting is carried out on site in line with the proposed planting scheme and recommendations made by the ecologist to ensure that the ecological value of the site

remains unchanged or is improved. Calculations confirming the change in ecological value occurring as a result of the project, in accordance with the process set out in GN36 must be provided.

### **9.1.8.3 LE 05: Long Term Ecology Management and Maintenance**

#### **Landscape and Ecology Management Plan**

The main contractor shall provide a copy of the landscape and ecology management plan, developed in accordance with BS 42020: 2013 Section 11.1, covering as a minimum the first five years after project completion, and includes the minimum BREEAM content.

### **9.1.9 POLLUTION**

#### **9.1.9.1 POL 01: Impact of Refrigerants**

##### **Impact of Refrigerant**

The main contractor shall ensure all systems with electric compressors comply with the requirements of BS EN 378:2016 (parts 2 and 3). The direct effect life cycle CO<sub>2</sub> equivalent emissions (DELCO) must be  $\leq 100$  CO<sub>2</sub>-eq/kW. Alternatively, all refrigerants used may have a global warming potential (GWP) of  $\leq 10$ .

##### **Leak Detection**

Ensure that all systems are hermetically sealed or only use environmentally benign refrigerants, or alternatively where systems are not hermetically sealed, they:

- a. Have a permanent automated refrigerant leak detection system, that is robust and tested, and capable of continuously monitoring for leaks, or;
- b. Have an inbuilt automated diagnostic procedure for detecting leakage, that must be capable of automatically responding and managing the remaining refrigerant charge to limit loss of refrigerant in the event of a leak.

#### **9.1.9.2 POL 02: Local Air Quality**

The main contractor shall confirm that all heating and hot water is supplied by non-combustion systems, or emissions from all installed combustion plant that provide space heating and domestic hot water do not exceed the levels set in Table 12.4 and Table 12.5 of the BREEAM NC 2018 scheme guidance.

#### **9.1.9.3 POL 03: Surface Water Run-Off**

The main contractor shall implement and install/connect to any attenuation/pollution prevention measures as specified by the site-specific drainage design and Flood Risk Assessment to ensure that the risk and impact of localised flooding on and off-site is minimised.

#### **9.1.9.4 POL 05: Reduction of Noise Pollution**

The main contractor shall appoint a 'Suitably Qualified Acoustician' to carry out a noise impact assessment in compliance with BS 4142: 2014 to measure/determine the following noise levels:

- a. Existing background noise levels:
  - i. At the nearest or most exposed noise-sensitive development to the proposed assessed site
  - ii. Including existing plant on a building, where the assessed development is an extension to the building.
- b. Noise rating level from the assessed building.

The noise level from the assessed building, as measured in the locality of the nearest or most exposed noise-sensitive development, must be at least 5dB lower than the background noise throughout the day and night.

If the noise sources from the assessed building are greater than the levels described above, the main contractor shall install measures to attenuate the noise at its source to a level where it will comply with the above criteria.

## 9.2 Appendix B – BREEAM New Construction 2018 Manual, Issue 3.0

<https://www.breem.com/NC2018/>