Holborn Links - Project 4

BREEAM Office Non-Domestic Refurbishment 2014
Pre-Assessment
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1. INTRODUCTION

A BREEAM pre-assessment strategy was undertaken using BREEAM Non-Domestic Refurbishment (NDR) 2014 (Version: SD216, issue: 1.1) guidance. The NDR scheme provides a modular framework split up into four separate parts,

- Part 1: Fabric and Structure,
- Part 2: Core Services,
- Part 3: Local Services and
- Part 4: Interior Design.

Based on the current scope of the proposed development works, it is believed that the assessment should fall under Part 2, Part 3 and Part 4 of the NDR methodology.

Project specific questions have been used to filter the credits available, as detailed in the following sections.

Next, for each of BREEAM's nine environmental sections the number of targeted 'credits' have been determined in accordance with the criteria of each assessment issue (as detailed in the technical sections of the BREEAM guidance documentation).

The percentage of target 'credits' achieved has been calculated for each section.

The percentage of target 'credits' achieved in each section has been multiplied by the corresponding section weighting to give an overall section score. The section scores have been added together to give the overall BREEAM score.

The overall target score has then been compared to the BREEAM rating benchmark levels and, provided all minimum standards have been met, the target BREEAM rating is predicted at **59.73%** which is indicative of a **Very Good** rating.

2. BREEAM

The BREEAM UK Refurbishment and Fit-out (RFO) scheme is a performance-based assessment method and certification scheme for existing building refurbishment and fit-out projects. The primary aim of BREEAM UK Refurbishment and Fit-out is to promote the delivery of sustainable refurbishment and fit-out, in order to mitigate the life cycle impacts of existing buildings on the environment in a robust and cost-effective manner. This is achieved through integration and use of the scheme by Clients and their project teams at key stages in the design and refurbishment/fit-out works process. This enables the Client, through the BREEAM assessor and the BRE Global certification process, to measure, evaluate and reflect the performance of their refurbishment or fit-out project against best practice in an independent and robust manner.

As illustrated below, the scheme provides a modular framework split up into four separate parts, that are assessed according to the scope of work of the project, with each part defining a set of individual measures and associated criteria that each project is assessed against. This allows projects to be assessed against the parts that are within the scope of influence of the project, while also ensuring that similar project types are assessed against a comparable set of criteria. This approach provides the scheme's users with a flexible means of measuring the environmental performance of their building and comparing it with other buildings across the property market, backed with the assurance that independent third-party certification of the assessment process provides.

Figure 1: BREEAM Refurbishment and Fit out – Part1, 2, 3, 4

2.1. Part 1: Fabric and Structure

A Part 1 assessment may be appropriate where a refurbishment project includes one or more of the following alterations to the building fabric and where the area to be renovated is greater than 50 per cent of the surface of the individual element or 25 per cent of the total building envelope:

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

2.2. Part 2: Core Services

A Part 2 assessment may be appropriate where at least two of the following are being installed or upgraded to a level that requires compliance with the Building Regulations Compliance Guide:

- Central air handling unit
- Heating boiler
- More than 50% of heat distribution Chiller plant
- More than 50% of chiller distribution Water services (sanitary fittings in core) Building management system Community heating system (e.g. CCHP) Low and zero carbon technologies.

2.3. Part 3: Local Services

A Part 3 assessment may be appropriate where at least two of the following fixed local building services are being installed or upgraded e.g. a replacement or new installation of local heating/cooling units:

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

2.4. Part 4: Interior Design

A Part 4 assessment may be appropriate where the refurbishment or fit-out works involve changes to the layout and/or redecoration of the refurbishment or fit-out area. including:

Remodelling/changes to interior spaces including two or more of the following:

- Wall coverings (alterations to at least 50% by area)
- Floor coverings (alterations to at least 50% by area)
- Ceiling covering or systems (alterations to at least 50% by area) Partitions (alterations to at least 50% by area)
- Raised floor system (alterations to at least 50% by area)
- Furniture and fittings e.g. office furniture, retail display furniture and fittings etc. (alterations to at least 50% by area).

AND at least one of the following:

- Sanitary fittings e.g. tea/coffee points, kitchenette and washrooms (alterations to at least 50% of fittings) Equipment e.g. Office equipment, display lighting, display chillers/freezers (alterations to at least 50% of equipment)
- Local electrical installations e.g. sub-metering.

3. SCOPE OF THE ASSESSMENT

For this development, at the time of writing this report, knowing that the core building services undergone major refurbishment, there will be schedule for internal services upgrade and some alteration to the external building fabric is possible, the following RFO parts are chosen:

- Part 1: Fabric and structure **No**
- Part 2: Core services **Yes**
- Part 3: Local services **Yes**
- Part 4: Interior design **Yes**

4. PROJECT SPECIFIC QUESTIONS TO FILTER THE CREDITS

Historic building (listed building or building in a conservation area)	Yes, grade 2 listed (England or Wales)
Is commercial and/or industrial scale refrigeration or storage specified/present	No
Are building user transportation systems (lifts and/or escalators) specified/present?	No
Are there systems that significantly contribute towards unregulated energy demands?	No
For industrial buildings, are there office areas?	N/A
Where the scope of the refurbishment covers tenancy areas only, are sanitary fittings present in the tenanted areas?	Yes
Does the building have or mitigate any unregulated water demand? e.g. irrigation or soft-landscaped areas requiring no irrigation, car washing, other significant process related	No
Are there new or existing landscaping areas within the refurbishment or fit-out zone and within developer control?	Yes - existing and new, or existing only
Are there any external areas within the refurbishment or fit-out zone and within developer control that can feasibly be enhanced in line with LE 04	Yes

Is there any local cooling present or within scope of refurbishment or fit-out works?	Yes
Is there any local heating or hot water present or within scope of refurbishment or fit-out works?	Yes
Is any externally mounted plant present or specified?	Yes
Is this a speculative refurbishment?	No
Is external lighting within scope of the refurbishment or fit-out zone?	Yes
Is this a simple building?	No
If undertaking a Part 4 assessment, is there any equipment specified that requires commissioning (see Man04 CN13)	No
Is any new insulation specified?	Yes
Is Wat01 within the scope of the assessment in accordance with Table 42?	Yes
Are high grade aggregates to be used in the refurbishment scheme?	No

5. BREEAM RATING AND BENCHMARK

The BREEAM method addresses impacts of a building on the global, local and indoor environments across a range of issues, grouped under the headings of:

- Management (Man)
- Health and Wellbeing (Hea)
- Energy (Ene)
- Transport (Tra)
- Water (Wat)
- Materials (Mat)
- Waste (Wst)
- Land Use & Ecology (Le)
- Pollution (Pol).

How these are combining to produce a BREEAM rating for a refurbishment or fit-out project is summarised on the following pages. This is followed by a description and example describing the methodology for calculating a rating. The BREEAM rating scores for projects assessed using the 2014 version of BREEAM UK Refurbishment and Fit-out are as follows:

Table 1: BREEAM rating score threshold

BREEAM Rating	% Score
OUTSTANDING	≥ 85
EXCELLENT	≥ 70
VERY GOOD	≥ 55
GOOD	≥ 45
PASS	≥ 30
UNCLASSIFIED	< 30

The BREEAM NDR 2014 methodology includes several mandatory credits which must be obtained to achieve a certain rating. The minimum standards required for each rating level are shown in Table 2 below.

The target for this project is to achieve Very Good rating.

Table 2: Minimum Standards by BREEAM Rating Level

	Minimum standard for each BREEAM rating				
BREEAM issue	Pass	Good	Very Good	Excellent	Outstanding
Man 03: Responsible construction practices	None	None	None	One credit (Considerate Construction)	Two credits (Considerate Construction)
Man 04: Commissioning and handover	None	None	None	Criterion 9 (Building User Guide)	Criterion 9 (Building User Guide)
Man 05: Aftercare	None	None	None	Criterion 9 (Seasonal Commissioning)	Criterion 9 (Seasonal Commissioning)
Ene 01: Reduction of energy use and carbon emissions	None	None	None	Five Credits	Eight Credits
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 materials	Criterion 1 only	Criterion 1 only	Criterion 1 only	Criterion 1 only	Criterion 1 only
Wst 01: Construction waste management	None	None	None	None	One credit
Wst 03: Operational waste	None	None	None	One credit	One credit

6. SUMMARY

The BRE Pre-Assessment estimator tool was used and below provides a summary of the credits that are targeted.

Table 3: Summary of BREEAM RFO (2014) Pre-Assessment

BREEAM Rating					
	Credits available	Credits targeted	% Credits targeted	Weighting	Target Score
Man	20	13	65.00%	14.48%	9.41%
Hea	19	10	52.63%	16.42%	8.64%
Ene	21	11	52.38%	15.32%	8.02%
Tra	7	5	71.43%	5.91%	4.22%
Wat	8	6	75.00%	6.76%	5.07%
Mat	13	6	46.15%	15.84%	7.31%
Wst	10	7	70.00%	7.92%	5.54%
Le	3	3	100.00%	7.60%	7.60%
Pol	10	4	40.00%	9.75%	3.90%
Inn	10	0	0.00%	10%	0.00%
Total	121	65	-	-	59.73%
Rating	-	-	-	-	Very Good

The assumptions made as part of the preliminary pre-assessment indicate that the proposals can meet all the mandatory level requirements for a targeted rating. A score of **59.73%** is predicted at present which is indicative of **Very Good** rating.

The BREEAM criteria and the commitments made are shown in the following section

7. CREDITS REQUIREMENTS AND RESPONSIBILITY MATRIX

Below provided the list of requirements and responsibilities to achieve the targeted BREEAM rating. Those credits which are not relevant to the chosen Refurbishment or Fit out project (RFO), are shown as N/A (i.e. have been filtered out). RIBA Stage 2, time critical credits are highlighted in Green in the last column.

Credit	Requirement	Credits Available	Credits Targeted	Responsibility Of	RIBA Stage Critical
Man 01: Stakeholder Consultation (Project Delivery)	Prior to completion of the Concept Design (RIBA Stage 2 or equivalent), 1- A clear sustainability brief is developed prior to Concept Design which sets out. a. Client requirements e.g. internal environmental conditions required b. Sustainability objectives and targets including target BREEAM rating, business objectives etc. c. Timescales and budget d. List of consultees and professional appointments that may be required e.g. Suitably Qualified Acoustician etc. e. Constraints for the project e.g. technical, legal, physical, environmental. 2.Prior to completion of the Concept Design (RIBA Stage 2 or equivalent), the project delivery stakeholders (see Relevant definitions) have met to identify and define their roles, responsibilities and contributions for each of the key phases of project delivery. 3.In defining the roles and responsibilities for each key phase of the project, the following must be considered: • End user requirements • Aims of the design and design strategy • Particular installation and construction requirements/limitations • Occupiers budget and technical expertise in maintaining any proposed systems • Maintainability and adaptability of the proposals • Requirements for the production of project and end user documentation • Requirements for commissioning, training and aftercare support. 4.The project team demonstrate how the project delivery stakeholder contributions and the outcomes of the consultation process have influenced or changed the Initial Project Brief, including if appropriate, the Project Execution Plan, Communication Strategy, and the Concept Design.	1	1	PM CLIENT	RIBA 2
Man 01: Stakeholder Consultation (Third Party)	Prior to completion of the Concept Design stage, all relevant third-party stakeholders have been consulted by the design team and this covers the minimum consultation content (see compliance note CN3). The project must demonstrate how the stakeholder contributions and outcomes of the consultation exercise have influenced or changed the Initial Project Brief and Concept Design. Prior to completion of the detailed design (RIBA Stage 4, Technical Design or equivalent), consultation feedback has been given to, and received by, all relevant parties.	1	0	-	RIBA 4
Man 01: Sustainability Champion (design)	A Sustainability Champion has been appointed to facilitate the setting and achievement of BREEAM performance target(s) for the project. The design stage Sustainability Champion is appointed to perform this role during the feasibility stage (Stage 1, Preparation and Brief stage, as defined by the RIBA Plan of Work 2013 or equivalent). The defined BREEAM performance target(s) has been formally agreed (see Relevant definitions) between the client and design/project team no later than the Concept Design stage (RIBA Stage 2 or equivalent). To achieve this credit at the interim design stage assessment, the agreed BREEAM performance target(s) must be demonstrably achieved by the project design. This must be demonstrated via the BREEAM Assessor's design stage assessment report.	1	0	-	RIBA 2

Credit	Requirement	Credits Available	Credits Targeted	Responsibility Of	RIBA Stage Critical
Man 01: Sustainability Champion (Monitoring Progress)	The Sustainability Champion (design) criteria have been achieved. A Sustainability Champion is appointed to monitor progress against the agreed BREEAM performance target(s) throughout the design process and formally report progress to the client and design team. To do this the Sustainability Champion must attend key project/design team meetings during the Concept Design, Developed Design and Technical Design stages, as defined by the RIBA Plan of Work 2013, (RIBA Stage 3) reporting during, and prior to, completion of each stage, as a minimum.	1	0	-	RIBA 3
Man 02: LCC - Elemental Life Cycle Cost (LCC)	An elemental life cycle cost (LCC) analysis has been carried out, at Process Stage 2 (equivalent to Concept Design - RIBA Stage 2) together with any design option appraisals in line with 'Standardised method of life cycle costing for construction procurement' PD 156865:20081. The LCC analysis shows: • An outline LCC plan for the project based on the building's basic structure and envelope, appraising a range of options and based on multiple cash flow scenarios e.g. 20, 30, 50+ years. • The fabric and servicing strategy for the project outlining services component and fit-out options (if applicable) over a 15-year period, in the form of an 'elemental LCC Plan'.	2	0	-	RIBA 2
Man 02: LCC - Component level LCC Plan	A component level LCC plan has been developed by the end of Process Stage 4 (equivalent to Technical Design – RIBA Stage 4) in line with PD 156865:2008 and includes the following component types (where present): • Envelope, e.g. cladding, windows, and/or roofing • Services, e.g. heat source cooling source, and/or controls • Finishes, e.g. walls, floors and/or ceilings • External spaces, e.g. alternative hard landscaping, boundary protection. Demonstrate, using appropriate examples provided by the design team, how the component level LCC plan has been used to influence building and systems design/specification to minimise life cycle costs and maximise critical value.	1	1	CLIENT PM	RIBA 4
Man 02: Capital Cost Reporting	Report the capital cost for the building in pounds per square metre (£k/m^2), via the BREEAM Assessment Scoring and Reporting tool, Assessment Issue Scoring tab, Management section.	1	1	COST CONSULTANT	
Man 03: Responsible Construction Practices Pre-Requisite	All timber and timber-based products used on the project is 'Legally harvested and traded timber' (see Relevant definitions).	✓	✓	CONTRACTOR	
Man 03: Environmental Management	The principal contractor operates an environmental management system (EMS) covering their main operations. The EMS must be either: • Third party certified, to ISO 14001/EMAS or equivalent standard; or • Have a structure that is in compliance with BS 8555:2003 and has reached phase four of the implementation stage, 'implementation and operation of the environmental management system', and has completed phase audits one to four, as defined in BS 8555. The principal contractor implements best practice pollution prevention policies and procedures on-site in accordance with Pollution Prevention Guidelines, Working at construction and demolition-sites: PPG61.	1	1	CONTRACTOR	
Man 03:	A Sustainability Champion is appointed to monitor the project to ensure ongoing compliance with the relevant sustainability performance/process criteria, and therefore BREEAM target(s), during the Construction, Handover and Close Out stages (as defined by the RIBA Plan of Works 2013, stages 5 and 6). RIBA 5, 6 To do this the Sustainability Champion will ideally be site based or will visit the site regularly to carry out spot checks, with the relevant authority to do so and require	1	0	-	RIBA 5

Credit	Requirement	Credits Available	Credits Targeted	Responsibility Of	RIBA Stage Critical
Sustainability Champion (Construction)	action to be taken to address shortcomings in compliance. The Sustainability Champion will monitor site activities with sufficient frequency (see compliance note CN6) to ensure that risks of non-compliance are minimised. They will report on progress at relevant project team meetings including identifying potential areas of non-compliance and any action needed to mitigate. The defined BREEAM performance target forms a requirement of the principal contractor's contract (see compliance note Man 01 Project brief and design – CN5 and in Man 01 Project brief and design – Relevant definitions). To achieve this credit at the final post construction stage of assessment, the BREEAM-related performance target for the project must be demonstrably achieved by the project. This is demonstrated via the BREEAM Assessor's final post construction stage assessment report.				
Man 03: Considerate Construction	Where the principal contractor has used a 'compliant' organisational, local or national considerate construction scheme and their performance against the scheme has been confirmed by independent assessment and verification. The BREEAM credits can be awarded as follows: • two credits where the contractor significantly exceeds 'compliance' with the criteria of the scheme. Refer to the Relevant definitions section for a list of compliant schemes and therefore how performance, as determined by a compliant scheme, translates in to BREEAM credits.	2	2	CONTRACTOR	

Man 03:
Monitoring of Construction Site Impacts.
	Responsibility has been assigned to an individual(s) for monitoring, recording and reporting energy use, water consumption and transport data (where measured) resulting from all on-site construction processes (and dedicated off-site monitoring) throughout the build programme.
	To ensure the robust collection of information, this individual(s) must have the appropriate authority and responsibility to request and access the data required. Where appointed, the Sustainability Champion could perform this role.
	For Credit 1 - Energy consumption:
	Responsibility has been achieved.
	Monitor and record data on principal constructor's and subcontractors' energy consumption in kWh (and where relevant, litres of fuel used) as a result of the use of construction plant, equipment (mobile and fixed) and site accommodation.
	Report the total carbon dioxide emissions (total $kgCO_2$/project value) from the construction process via the BREEAM Assessment Scoring and Reporting tool.
	For Credit 1 - Water consumption:
	Responsibility has been achieved.
	Monitor and record data on principal constructor's and subcontractors' potable water consumption (m^3) arising from the use of construction plant, equipment (mobile and fixed) and site accommodation.
	Using the collated data report the total net water consumption (m^3), i.e. consumption minus any recycled water use, from the construction process via the BREEAM Assessment Scoring and Reporting tool.
	For Credit 2 - Transport of construction materials and waste:
	Monitor and record data on transport movements and impacts resulting from delivery of the majority of construction materials to site and construction waste from site. As a minimum this must cover:
	• Transport of materials from the factory gate to the building site, including any transport, intermediate storage and distribution.
	• Scope of this monitoring must cover the following as a minimum:
	  ○ Materials used in major building elements (i.e. those defined in BREEAM issue Mat 01 Life cycle impacts), including insulation materials.
	  ○ Ground works and landscaping materials.
	• Transport of construction waste from the construction gate to waste disposal processing/recovery centre gate. Scope of this monitoring must cover the construction waste groups outlined in the project's waste management plan.
	Using the collated data, report separately for materials and waste, the total fuel consumption (litres) and total carbon dioxide emissions ($kgCO_2$ eq), plus total distance travelled (km) via the BREEAM Assessment Scoring and Reporting tool.
		2	2	CONTRACTOR	

Credit	Requirement	Credits Available	Credits Targeted	Responsibility Of	RIBA Stage Critical
Man 03: Exemplary Credit	With reference to the considerate construction criterion 7, in addition to meeting the criteria for two credits, the contractor achieves compliance with the criteria of the compliant scheme to an exemplary level of practice. • Exemplary level performance a CCS score of 40 or more. • A score of at least 7 in each of the five sections must be achieved.	1	0	-	
Man 04: Commissioning and testing schedule and responsibilities	A schedule of commissioning and testing 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 building fabric. All commissioning activities are carried out in accordance with current Building Regulations, BSRIA and CIBSE guidelines and/or other appropriate standards, where applicable. Where a building management system (BMS) is specified, refer to compliance note CN5 on BMS commissioning procedures. An appropriate project team member(s) is appointed to monitor and programme pre-commissioning, commissioning, testing and, where necessary, re-commissioning activities on behalf of the client. The principal contractor accounts for the commissioning and testing programme, responsibilities and criteria within their budget and main programme of works, allowing for the required time to complete all commissioning and testing activities prior to handover.	1	1	M&E SUB CONTRACTOR CONTRACTOR	
Man 04: Commissioning building services	For buildings with complex building services and systems, a specialist commissioning manager is appointed during the design stage (by either the client or the principal contractor) with responsibility for: • Undertaking design reviews and giving advice on suitability for ease of commissioning. • Providing commissioning management input to construction programming and during installation stages. • Management of commissioning, performance testing and handover/post-handover stages. Where there are simple building services, this role can be carried out by an appropriate project team member (see criterion 3), provided they are not involved in the general installation works for the building services system(s).	1	1	PM CONTRACTOR	
Man 04: Testing and inspecting building fabric	The commissioning and testing schedule and responsibilities credit is achieved. The integrity of the building fabric, including continuity of insulation, avoidance of thermal bridging and air leakage paths is quality assured through completion of post construction testing and inspection. Dependent on building type or construction, this can be demonstrated through the completion of a thermographic survey as well as an airtightness test and inspection (see compliance notes CN6 and CN7. The survey and testing is undertaken by a Suitably Qualified Professional (see Relevant definitions) in accordance with the appropriate standard. Any defects identified in the thermographic survey or the airtightness testing reports are rectified prior to building handover and close out. Any remedial work must meet the required performance characteristics for the building/element.	N/A	N/A	-	
Man 04: Handover	A Building User Guide (BUG) is developed prior to handover for distribution to the building occupiers and premises managers (see Relevant definitions). A training schedule is prepared for building occupiers/premises managers, timed appropriately around handover and proposed occupation plans, which includes the following content as a minimum: • The building's design intent • The available aftercare provision and aftercare team main contact(s), including any scheduled seasonal 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 Building User Guide and other relevant building documentation, e.g. design data, technical guides, maintenance strategy, operations and maintenance (O&M) manual, commissioning records, logbook etc. • Maintenance requirements, including any maintenance contracts and regimes in place.	1	1	CONTRACTOR CLIENT	

Credit	Requirement	Credits Available	Credits Targeted	Responsibility Of	RIBA Stage Critical
Man 05: Aftercare Support	There is (or will be) operational infrastructure and resources in place to provide aftercare support to the building occupier(s), which includes the following as a minimum: a. A meeting programmed to occur between the aftercare team/individual and the building occupier/management (prior to initial occupation, or as soon as possible thereafter) to: i. Introduce the aftercare team or individual to the aftercare support available, including the Building User Guide (where existing) and training schedule/content. ii. Present key information about features of the refurbished building including the design intent and how to use the building to ensure it operates as efficiently and effectively as possible (including the use of local services and controls and central services, as applicable). b. On-site facilities management training, to include a walkabout of the refurbished area of the building and 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 provision for at least the first month of building occupation, e.g. on-site attendance on a weekly basis to support building users/and management and to conduct a walk-around to examine how the refurbished area of the building is being used/operated to identify any issues that need to be communicated to building users/facilities managers (this could be more or less frequent depending on the complexity of the building and building operations). d. Longer term aftercare support provision for occupants for at least the first 12 months from occupation, e.g. a helpline, nominated individual or other appropriate system to support building users/management. There is (or will be) operational infrastructure and resources in place to coordinate the collection and monitoring of energy and water consumption data for a minimum of 12 months (for Part 4, where local metering is available and accessible), once the building is occupied. Discrepancies between actual and predicted performance should be identified, with a commitment to identify actions required to address any discrepancies such as adjusting systems and/or to develop/review operational policies to influence user behaviours accordingly.	1	1	CONTRACTOR CLIENT	
Man 05: Seasonal Commissioning	The following seasonal commissioning activities will be completed over a minimum 12-month period, once the building becomes substantially occupied: a. Complex systems - Specialist Commissioning Manager: i. Testing of all building services under full load conditions, i.e. heating equipment in mid-winter, cooling/ventilation equipment in mid-summer, and under part load conditions (spring/autumn). ii. Where applicable, testing should also be carried out during periods of extreme (high or low) occupancy. iii. Interviews with building occupants (where they are affected by the complex services) to identify problems or concerns regarding the effectiveness of the systems. iv. Re-commissioning of systems (following any work needed to serve revised loads) and incorporating any revisions in operating procedures into the operations and maintenance (O&M) manuals. b. Simple systems (naturally ventilated) - external consultant/aftercare team/facilities manager: i. Review thermal comfort, ventilation, and lighting, at three, six- and nine-month intervals after initial occupation, either by measurement or occupant feedback. ii. Take all reasonable steps to re-commission systems following the review to take account of deficiencies identified and incorporate any relevant revisions in operating procedures into the O&M manuals.	1	1	CONTRACTOR	
Man 05: Post Occupancy Evaluation	The client or building occupier makes a commitment to carry out a post occupancy evaluation (POE) exercise one year after initial building occupation. This is done to gain in-use performance feedback from building users to inform operational processes, including re-commissioning activities, and maintain or improve productivity, health, safety and comfort. The POE is carried out by an independent party and needs to cover: a. A review of the design intent and construction process (review of design, procurement, construction and handover processes). b. Feedback from a wide range of building users including facilities management on the design and environmental conditions of the building covering: i. Internal environmental conditions (light, noise, temperature, air quality) ii. Control, operation and maintenance iii. Facilities and amenities iv. Access and layout v. Other relevant issues. c. Sustainability performance (energy/water consumption, performance of any sustainable features or technologies, e.g., materials, renewable energy, rainwater harvesting etc.). 5. The client or building occupier makes a commitment to carry out the appropriate dissemination of information on the building's post occupancy performance. This is done to share good practice and lessons learned and inform changes in user behaviour, building operational processes and procedures, and system controls.	1	0	-	

Credit	Requirement	Credits Available	Credits Targeted	Responsibility Of	RIBA Stage Critical
Hea 01: Glare Control	The potential for disabling glare has been designed out of all relevant building areas using a glare control strategy, either through building form and layout and/or building design measures (see compliance note CN7). The glare control strategy avoids increasing lighting energy consumption, by ensuring that: a. The glare control system is designed to maximise daylight levels under all conditions while avoiding disabling glare in the workplace or other sensitive areas. The system should not inhibit daylight from entering the space under cloudy conditions, or when sunlight is not on the façade: AND b. The use or location of shading does not conflict with the operation of lighting control systems.	1	1	ARCHITECT	
Hea 01: Daylighting	Daylighting criteria have been met using either of the following options: The relevant building areas meet good practice daylight factor(s) and another criterion as outlined in Table - 12 and Table - 13. OR The relevant building areas meet good practice average and minimum point daylight illuminance criteria as outlined in Table - 14.	1	0	-	
Hea 01: View out	Two credits where 95% of the floor area in relevant building areas is within 7m of a wall which has a window or permanent opening that provides an adequate view out. One credit where 80% of the floor area space in relevant building areas is within 7m of a wall which has a window or permanent opening that provides an adequate view out and criterion 8 is met. The window/opening must be ≥ 20% of the surrounding wall area (refer to Relevant definitions in the Additional information section). Where the room depth is greater than 7m, compliance is only possible where the percentage of window/opening is the same as, or greater than, the values in Table 1.0 of BS 8206. In addition, the building type criteria in Table - 15 are applicable to view out criteria.	1	0	-	
Hea 01: Exemplary Credit	The following outlines the exemplary level criteria to achieve an innovation credit for daylighting: Daylighting criteria have been met using either of the following options: a. Relevant building areas meet exemplary daylight factor(s). OR b. Relevant building areas meet exemplary average and minimum point daylight illuminance criteria.	1	0	-	
Hea01: Internal and External Lighting	Internal Lighting 1. All fluorescent and compact fluorescent lamps are fitted with high frequency ballasts. 2. Internal lighting in all relevant areas of the building is designed to provide an illuminance (lux) level appropriate to the tasks undertaken, accounting for building user concentration and comfort levels. This can be demonstrated through a lighting design strategy that provides illuminance levels in accordance with the SLL Code for Lighting 2012 and any other relevant industry standard. 3. For areas where computer screens are regularly used, the lighting design complies with CIBSE Lighting Guide 7 sections 3.3, 4.6, 4.7, 4.8 and 4.9. This gives recommendations highlighting: a. Limits to the luminance of the luminaires to avoid screen reflections. (Manufacturers' data for the luminaires should be sought to confirm this.) b. For up lighting, the recommendations refer to the luminance of the lit ceiling rather than the luminaire; a design team calculation is usually required to demonstrate this. c. Recommendations for direct lighting, ceiling illuminance, and average wall illuminance. External Lighting All external lighting located within the refurbishment or fit-out zone is designed to provide illuminance levels that enable users to perform outdoor visual tasks efficiently and accurately, especially during the night. To demonstrate this, external lighting provided is specified in accordance with BS 5489-1:2013 Lighting of roads and public amenity areas and BS EN 12464-2:2014 Light and lighting - Lighting of workplaces - Part 2: Outdoor workplaces.	1	1	M&E	

Credit	Requirement	Credits Available	Credits Targeted	Responsibility Of	RIBA Stage Critical
	Zoning Internal lighting is zoned to allow for occupant control (see Relevant definitions) in accordance with the criteria below for relevant areas present within the building: a. In office areas, zones of no more than four workplaces b. Workstations adjacent to windows/atria and other building areas separately zoned and controlled c. Seminar and lecture rooms: zoned for presentation and audience areas d. Library spaces: separate zoning of stacks, reading and counter areas e. Teaching space or demonstration area f. Whiteboard or display screen g. Auditoria: zoning of seating areas, circulation space and lectern area k. Dining, restaurant, café areas: separate zoning of servery and seating/dining areas l. Retail: separate zoning of display and counter areas m. Bar areas: separate zoning of bar and seating areas n. Wards or bedded areas: zoned lighting control for individual bed spaces and control for staff over groups of bed spaces o. Treatment areas, dayrooms, waiting areas: zoning of seating and activity areas and circulation space with controls accessible to staff. Note: the criteria for zoning of lighting control are excluded for assessments of prison buildings. p. Areas used for teaching, seminar or lecture purposes have lighting controls provided in accordance with CIBSE Lighting Guide 5.				
Hea 02: Indoor Air Quality Minimising Sources of Air Pollution – Indoor Air Quality Plan	**One credit - Indoor air quality (IAQ) plan** An indoor air quality plan has been produced and implemented, with the objective of facilitating a process that leads to design, specification and installation decisions and actions that minimise indoor air pollution during the design, construction and occupation of the building. The indoor air quality plan must consider the following: a. Removal of contaminant sources b. Dilution and control of contaminant sources c. Procedures for pre-occupancy flush out d. Protection of Heating Ventilation and Air Conditioning (HVAC) systems from sources of pollution during refurbishment/fit-out works e.g. dust e. Procedures for protecting the indoor air quality of areas outside of the refurbishment or fit-out zone that may be affected by the refurbishment/fit-out works f. Procedures for identifying and implementing third party testing and analysis required to ascertain that the contaminant sources have been removed effectively before occupancy. g. Commitments for maintaining indoor air quality in-use, e.g. maintenance and cleaning of the HVAC system, ductwork and filters.	1	1	INDOOR AIR QUALITY CONSUTANT	

Credit	Requirement	Credits Available	Credits Targeted	Responsibility Of	RIBA Stage Critical
	One Credit – Ventilation Refurbishment and fit-out works include measures to minimise the concentration and recirculation of pollutants in the building as follows: Provide fresh air into the building in accordance with the criteria of the relevant standard for ventilation. Design ventilation pathways to minimise the build-up of air pollutants in the building, as follows: a. In air conditioned and mixed mode buildings/spaces: i. The building's air intakes and exhausts are over 10m apart and intakes are over 20m from sources of external pollution. ii. The location of the building's air intakes and exhausts, in relation to each other and external sources of pollution, is designed in accordance with BS EN 13779:20071 Annex A2. b. In naturally ventilated buildings/spaces: openable windows/ventilators are over 10m from sources of external pollution. Where present, HVAC systems must incorporate suitable filtration to minimise external air pollution, as defined in BS EN 13779:2007 Annex A3. Areas of the building subject to large and unpredictable or variable occupancy patterns have carbon dioxide (CO_2) or air quality sensors specified and: a. In mechanical ventilated buildings/spaces: sensor(s) are linked to the mechanical ventilation system and provide demand-controlled ventilation to the space. b. In naturally ventilated buildings/spaces: sensors either have the ability to alert the building owner or manager when CO_2 levels exceed the recommended set point or are linked to controls with the ability to adjust the quantity of fresh air, i.e. automatic opening windows/roof vents.	1	0	-	
Hea 02: Volatile Organic Compound (VOC) emission levels (products)	**One credit - Volatile organic compound (VOC) emission levels (products)** All decorative paints and varnishes specified meet the criteria in Table 20 At least five of the seven remaining product categories listed in Table 20 meet the testing requirements and emission levels criteria for volatile organic compound (VOC) emissions (listed in table 20 of the BREEAM manual).	1	0	-	
Hea 02: Volatile Organic Compound (VOC) emission levels (post construction)	The formaldehyde concentration level is measured post construction (but pre-occupancy) and is found to be less than or equal to 100µg/averaged over 30 minutes (WHO guidelines for indoor air quality: Selected pollutants, 2010[3]). The total volatile organic compound (TVOC) concentration level is measured post construction (but pre-occupancy) and found to be less than 300µg/over 8 hours, in line with the Building Regulation requirements. Where VOC and formaldehyde levels are found to exceed the limits defined in criteria 8 and 9, the project team confirms the measures that have, or will be taken, in accordance with the IAQ plan, to reduce the levels to within these limits, including re-measurement. The IAQ Plan should outline what remedial measures are appropriate depending on the severity and type of the non-compliance with prescribed limits. Such measures may include re-testing as a matter of best practice, The testing and measurement of the above pollutants are in accordance with the following standards where relevant: BS ISO 16000-4: 2011 Diffusive sampling of formaldehyde in air[4] BS ISO 16000-6: 2011 VOCs in air by active sampling[5] BS EN ISO 16017-2: 2003 VOCs - Indoor, ambient and workplace air by diffusive sampling[6] BS ISO 16000-3: 2011[7] Formaldehyde and other carbonyls in air by active sampling The measured concentration levels of formaldehyde (µg/m^3) and TVOC (µg/m^3) are reported, via the BREEAM Assessment Scoring and Reporting Tool.	1	0	-	
Hea 02:	The building ventilation strategy is designed to be flexible and adaptable to potential building occupant needs and climatic scenarios. This can be demonstrated as follows:	1	0	-	

Credit	Requirement	Credits Available	Credits Targeted	Responsibility Of	RIBA Stage Critical
Adaptability Potential for natural ventilation	• Occupied spaces of the building are designed to be capable of providing fresh air entirely via a natural ventilation strategy. The following are methods deemed to satisfy this criterion dependent upon the complexity of the proposed system: o Room depths are designed in accordance with CIBSE AM10 (section 2.4) to ensure effectiveness of any natural ventilation system. The open-able window area in each occupied space is equivalent to 5% of the gross internal floor area of that room/floor plate. OR o The design demonstrates that the natural ventilation strategy provides adequate cross flow the required of air to maintain thermal comfort conditions and ventilation rates. This is demonstrated using ventilation design tool types recommended by CIBSE AM10 (or for education buildings by using the Class Vent tool).				
Hea 04: Thermal Comfort Modelling	Thermal modelling has been carried out using software in accordance with CIBSE AM11 Building Energy and Environmental Modelling. The software used to carry out the simulation at the detailed design stage provides full dynamic thermal analysis. For smaller and more basic building designs with less complex heating or cooling systems, an alternative less complex means of analysis may be appropriate (such methodologies must still be in accordance with CIBSE AM11). The modelling demonstrates that: • For air conditioned buildings, summer and winter operative temperature ranges in occupied spaces are in accordance with the criteria set out in CIBSE Guide A Environmental design2, Table 1.5; or other appropriate industry standard (where this sets a higher or more appropriate requirement/level for the building type). • For naturally ventilated/free running buildings: o Winter operative temperature ranges in occupied spaces are in accordance with the criteria set out in CIBSE Guide An Environmental design, Table 1.5; or other appropriate industry standard (where this sets a higher or more appropriate requirement/level for the building type). o The building is designed to limit the risk of overheating, in accordance with the adaptive comfort methodology outlined in CIBSE TM52: The limits of thermal comfort: avoiding overheating in European buildings. For air-conditioned buildings, the PMV (predicted mean vote) and PPD (predicted percentage of dissatisfied) indices based on the above modelling are reported via the BREEAM assessment scoring and reporting tool.	1	1	THERMAL MODELLING CONSULTANT	
Hea 04: Thermal Comfort Adaptability for climate change scenario.	Thermal modelling has been achieved. The thermal modelling demonstrates that the relevant requirements set out above are achieved for a projected climate change environment (see relevant definitions). Where thermal comfort criteria are not met for the projected climate change environment, the project team demonstrates how the building has been adapted, or designed to be easily adapted in future using passive design solutions in order to subsequently meet the requirements under criterion 6. For air-conditioned buildings, the PMV and PPD indices based on the above modelling are reported via the BREEAM assessment scoring and reporting tool.	1	1	THERMAL MODELLING CONSULTANT	
Hea 04: Thermal Comfort Thermal zoning and controls	The thermal modelling analysis (undertaken for compliance with criteria 1 to 4) has informed the temperature control strategy for the building and its users. The strategy for proposed heating/cooling system(s) demonstrates that it has addressed the following: a. Zones within the building and how the building services could efficiently and appropriately heat or cool these areas. b. Where specified, any new local cooling or heating services (or changes to existing services) are designed to ensure they do not conflict with core services. c. The degree of occupant control required for these zones, based on discussions with the end user (or alternatively building type or use specific design guidance, case studies, feedback) considers: i. User knowledge of building services. ii. Occupancy type, patterns and room functions (and therefore appropriate level of control required). iii. How the user is likely to operate or interact with the system(s). iv. The user expectations (this may differ in the summer and winter) and degree of individual control (i.e. obtaining the balance between occupant preferences, for example some occupants like fresh air and others dislike drafts).	1	1	M&E	

Credit	Requirement	Credits Available	Credits Targeted	Responsibility Of	RIBA Stage Critical
	d. How the proposed systems will interact with each other (where there is more than one system) and how this may affect the thermal comfort of the building occupants. e. The need or otherwise for an accessible building user actuated manual override for any automatic systems.				
Hea 05: Acoustic Performance	1. The building meets the appropriate acoustic performance standards and testing requirements defined in the checklists and tables section which defines criteria for the acoustic principles of: a. Sound insulation b. Indoor ambient noise level c. Reverberation times. 2. Where undertaking a partial refurbishment or fit out, the performance standards and testing requirements defined in the checklist and tables section for the following principles are applicable to each assessment part: . Part 1: criteria for sound insulation and indoor ambient noise levels a. Part 2: criteria for indoor ambient noise levels only b. Part 3: criteria for sound insulation and indoor ambient noise levels c. Part 4: sound insulation and reverberation control – N/A 3. See relevant compliance notes on applicable assessment criteria, where undertaking a partial refurbishment or fit out for further information on how to apply the appropriate acoustic performance standards and testing requirements defined in this issue.	3	3	ACOUSTIC CONSULTANT	

Credit	Requirement	Credits Available	Credits Targeted	Responsibility Of	RIBA Stage Critical
	Table 23 BREEAM acoustic criteria for Office buildings **Office buildings (three credits)** **First credit - Sound insulation** Criteria: The sound insulation between acoustically sensitive rooms and other occupied areas complies with the performance criteria given in Section 7 of BS 8233:2014[5]. Testing requirement: A programme of pre-completion acoustic testing is carried out by a compliant test body in accordance with the acoustic testing and measurement procedures outlined in the Additional information section of this BREEAM issue. Notes: If testing is to be carried out where the office is not yet furnished, then section 7.5 of BS 8233:2014 should be referred to when determining the performance criteria. Where the office is to be furnished at the time testing is carried out, then refer to section 7.7.6 o 8233:2014 for the relevant performance criteria. **Second credit - Internal indoor ambient noise levels** Criteria: Achieve indoor ambient noise levels that comply with the design ranges given in Section 7 of BS 8233:2014. Testing requirement: A programme of acoustic measurements is carried out by a compliant test body in accordance with the acoustic testing and measurement procedures outlines in the Additional information section of this BREEAM issue. **Third credit - Reverberation** Criteria: Acoustic environment (control of reverberation, sound absorption and speech transmission index): Achieve the requirements relating to sound absorption and reverberation times, where applicable, set out in Section 7 of BS 8233:20 Testing Requirement: A programme of acoustic measurements is carried out by a compliant test body in accordance with the acoustic testing and measurement procedures outlined in the Additional information section of this BREEAM issue.				
Hea 06: Safety and Security of site and building.	A suitably qualified security specialist (SQSS) conducts an evidence-based Security Needs Assessment (SNA) during or prior to Concept Design (RIBA Stage 2 or equivalent). A suitably qualified security specialist (SQSS) develops a set of recommendations or solutions during or prior to Concept Design (RIBA Stage 2 or equivalent). These recommendations or solutions aim to ensure that the design of buildings, public and private car parks and public or amenity space are planned, designed and specified to address the issues identified in the preceding SNA. The recommendations or solutions proposed by the suitably qualified security specialist (SQSS) are implemented (see CN7). Any deviation from those recommendations or solutions will need to be justified, documented and agreed in advance with a suitably qualified security specialist.	1	1	ARCHITECT	RIBA 2

Credit	Requirement	Credits Available	Credits Targeted	Responsibility Of	RIBA Stage Critical
	Suitably Qualified Security Specialist (SQSS) An individual achieving any of the following can be considered to be 'suitably qualified' for the purposes of compliance with BREEAM: 1. Crime Prevention Design Advisors (CPDA) or Architectural Liaison Officers (ALO), Counter Terrorism Security Advisor (CTSA); or 2. A specialist registered with a BREEAM-recognised third party accreditation scheme for security specialists. 3. A practising security consultant that meets the following requirements: a. Minimum of three years relevant experience within the last five years. This experience must clearly demonstrate a practical understanding of factors affecting security in relation to construction and the built environment, relevant to the type and scale of the project being undertaken. b. Hold a suitable qualification relevant to security. c. Maintains (full) membership to a relevant professional body or accreditation scheme that meets the following: i. Has a professional code of conduct, to which members must adhere; and ii. Ongoing membership is subject to peer review. When appointing the suitably qualified security specialist, consideration should be given to the appropriateness of the individual to carry out the security needs assessment, based on the size, scope and security needs of the development. Organisations, associations or scheme operators who wish to have their membership recognised as a 'third party accreditation scheme for security specialist', should review their current status (and therefore their members) against the requirements above and, where they feel they are compliant, contact BRE Global with the relevant information/evidence. **Architectural Liaison Officer (ALO)** An ALO is the same as the Crime Prevention Design Advisor (see below) and is the title given to the same role in some police forces. http://www.securedbydesign.com/index.aspx **Counter Terrorism Security Advisor (CTSA)** CTSA's receive specialist training allowing them to identify and assess sites within their police force area that are deemed critical and may be vulnerable to terrorist and/or extremist attack. They then devise appropriate security plans to minimise impact on that site and the surrounding community. They also have responsibility for the protection afforded to Crowded Places (areas which by virtue of their crowd density may be liable to terrorist attack). **Crime Prevention Design Advisor (CPDA)** A Crime Prevention Design Advisor is a specialist crime prevention officer, trained at the Home Office Crime Reduction College, who deals with crime risk and designing out crime advice for the built environment. In addition to physical security measures the officer will consider defensible space, access, crime and movement generators all of which can contribute to a reduction in crime and disorder. http://www.securedbydesign.com/index.aspx **Security Needs Assessment (SNA)** The project and site specific assessment of security needs, including: 1. A visual audit of the site and surroundings, identifying environmental cues and features pertinent to the security of the proposed development. 2. Formal consultation with relevant stakeholders, including the local ALO, CPDA & CTSA (as applicable), in order to obtain a summary of crime and disorder issues in the immediate vicinity of the proposed development. 3. Identify risks specific to the proposed, likely or potential use of the building(s). 4. Identify risks specific to the proposed, likely or potential user groups of the building(s). 5. Identify any detrimental effects the development may have on the existing community. The purpose of the assessment is to inform stakeholder decision-making and allow the identification and evaluation of security recommendations and solutions.				

Credit	Requirement	Credits Available	Credits Targeted	Responsibility Of	RIBA Stage Critical
Ene 01: Reduction of energy use and carbon	Calculate an Energy Performance Ratio for New Constructions (EPRNC). Compare the EPRNC achieved with the benchmarks in Table - 25 and award the corresponding number of BREEAM credits. • Provision of pre-refurb energy modelling results • Provision of post refurb energy modelling results • Use BRE online tool to determine the score achieved	15	8	M&E	
Ene 02: Energy Monitoring Sub-metering of major energy consuming systems	Energy metering systems are installed that 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 (see Methodology). The energy consuming systems in buildings with a total useful floor area greater than 1,000m^2 are metered using an appropriate energy monitoring and management system. The systems in smaller buildings are metered either with an energy monitoring and management system or with separate accessible energy sub-meters with pulsed or other open protocol communication outputs, to enable future connection to an energy monitoring and management system (see Relevant definitions). The end energy consuming uses are identifiable to the building users, for example through labelling or data outputs.	1	1	M&E	
Ene 02: Energy Monitoring Sub-metering of high energy load and tenancy areas.	An accessible energy monitoring and management system or separate accessible energy sub-meters with pulsed or other open protocol communication outputs to enable future connection to an energy monitoring and management system are provided, covering a significant majority of the energy supply to tenanted areas or, in the case of single occupancy buildings, relevant function areas or departments within the building/unit.	1	1	M&E	
Ene 03: External Lighting	The building has been designed to operate without the need for external lighting (which includes on the building, signs and at entrances). **OR alternatively, where the building does have external lighting, one credit can be awarded as follows:** The average initial luminous efficacy of the external light fittings within the construction zone is not less than 60 luminaire lumens per circuit Watt. All external light fittings are automatically controlled for prevention of operation during daylight hours and presence detection in areas of intermittent pedestrian traffic.	1	1	M&E	
Ene 04: Passive design analyses	**One credit - Passive design analysis** The first credit within issue Hea04 Thermal comfort has been achieved to demonstrate the building design can deliver appropriate thermal comfort levels in occupied spaces. The project team carries out an analysis of the proposed building design/development to influence decisions made during Concept Design stage (RIBA Stage 2 or equivalent) and identify opportunities for the implementation of passive design solutions that reduce demands for energy consuming building services (see compliance note CN4). The building uses passive design measures to reduce the total heating, cooling, mechanical ventilation and lighting loads and energy consumption in line with the findings of the passive design analysis and the analysis demonstrates a meaningful reduction in the total energy demand as a result (see compliance note CN16).	1	0	-	RIBA 2
Ene 04: Free Cooling	**One credit - Free cooling** The passive design analysis credit is achieved. The passive design analysis carried out under criterion 2 includes an analysis of free cooling and identifies opportunities for the implementation of free cooling solutions. The building uses any of the free cooling strategies	1	0	-	

Credit	Requirement	Credits Available	Credits Targeted	Responsibility Of	RIBA Stage Critical
Ene 04: Low and zero carbon technologies	**One credit - Low zero carbon feasibility study** A feasibility study has been carried out by the completion of the Concept Design stage (RIBA Stage 2 or equivalent) by an energy specialist (see Relevant definitions) to establish the most appropriate recognised local (on-site or near-site) low or zero carbon (LZC) energy source(s) for the building/development (see compliance note CN7). A local LZC technology/technologies has/have been specified for the building/development in line with the recommendations of this feasibility study and this method of supply results in a meaningful reduction in regulated carbon dioxide (CO_2) emissions (see compliance note CN16).	1	0	-	RIBA 2
Ene 06: Energy Efficient Transportation System Energy Consumption	**THERE ARE ONLY EXISTING REFURB** Where lifts, escalators and/or moving walks (transportation types) are specified: • An analysis of the transportation demand and usage patterns for the building has been carried out to determine the optimum number and size of lifts, escalators and/or moving walks. • The energy consumption has been calculated in accordance with BS EN ISO 25745 Energy performance of lifts, escalators and moving walks, Part 2 : Energy calculation and classification for lifts (elevators) and/or Part 3 - Energy calculation and classification for escalators and moving walks, for one of the following: o At least two types of system (for each transportation type required); OR o An arrangement of systems (e.g., for lifts, hydraulic, traction, machine room-less lift (MRL)); OR o A system strategy which is 'fit for purpose'. o The use of regenerative drives should be considered, subject to the requirements in CN6. o The transportation system with the lowest energy consumption is specified	N/A	N/A	-	
Ene 06: Energy Efficient Transportation System Energy Efficient Features	**Lifts:** For each newly specified lift, the following three energy efficient features are specified and for existing lifts, at least two of the following energy efficient features are specified: • The lifts operate in a standby condition during off-peak periods. For example, the power side of the lift controller and other operating equipment such as lift car lighting, user displays, and ventilation fans switch off when the lift has been idle for a prescribed length of time. • The lift car lighting and display lighting provides an average lamp efficacy, (across all fittings in the car) of > 55 lamp lumens/circuit Watt. • The lift uses 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. **Escalators and/or moving walks:** Each escalator and/or moving walk complies with at least one of the following: It is fitted with a load-sensing device that synchronises motor output to passenger demand through a variable speed drive, OR It is fitted with a passenger-sensing device for automated operation (auto walk), so the escalator operates in standby mode when there is no passenger demand.	N/A	N/A	-	
Tra 01: Public Transport Accessibility	The public transport Accessibility Index (AI) for the assessed building is calculated and BREEAM credits awarded in accordance with the table of building types, AI benchmarks and BREEAM credits in Table - 29 (see checklists and tables). The Accessibility Index is determined by entering the following information in to the BREEAM Tra 01 calculator: • The distance (m) from the main building entrance to each compliant public transport node • The public transport type(s) serving the compliant node e.g. bus or rail	3	3	TRANSPORT CONSULTANT ARCHITECT	

Credit	Requirement	Credits Available	Credits Targeted	Responsibility Of	RIBA Stage Critical
	• The average number of services stopping per hour at each compliant node during the operating hours of the building for a typical day (see compliance notes and Table - 30 in the Additional Information section).				
Tra 02: Proximity to Amenities	Where the building is located within 500m and accessible to **at least two of** the following amenities: a. Grocery / Food Outlet. b. Post Box. c. Cash Machine. d. Access to a recreation/leisure facility for fitness/sports	1	1	TRANSPORT CONSULTANT ARCHITECT	
Tra 03: Cyclist Facilities	Compliant cycle storage spaces that meet the minimum levels set out in Table 38 (see Checklists and tables) are installed • 1 cycle space is provided for every 10 building occupants and compliant facilities are provided. At least two of the following types of compliant cyclist facilities have been provided for all building users (including pupils where appropriate to the building type) - see Relevant definitions for the scope of each compliant cyclist facility: a. Showers b. Changing facilities c. Lockers d. Drying spaces. **Compliant cycle storage spaces** Compliant cycle storage spaces are defined as those that meet the following: 1. Cycles can be secured within spaces in rack(s). They are covered overhead and the cycle racks are set in or fixed to a permanent structure (building or hardstanding). Alternatively the cycle storage may be located in a locked structure fixed to, or part of, a permanent structure with appropriate surveillance. 2. The distance between each cycle rack, and cycle racks and other obstructions, e.g. a wall, allows for appropriate access to the cycle storage space to enable bikes to be easily stored and accessed. 3. The storage facility or entrance to the facility is in a prominent site location that is viewable/overlooked from either an occupied building or a main access to a building. 4. The cycle storage facility has adequate lighting; this could be demonstrated with the lighting criteria defined in BREEAM issue Hea 01 Visual comfort. The lighting must be controlled to avoid out-of-hours use and operation during daylight hours, where there is sufficient daylight in or around the facility. **Compliant showers** Compliant showers are defined as those that meet the following: 1. Provision of one shower for every 10 cycle storage spaces, subject to a minimum provision of one shower. 2. Any building providing eight showers or more will comply regardless of the number of cycle storage spaces provided. 3. Both male and female users must be catered for, i.e. either separate showers within shared gender-specific facilities (required provision split 50-50) or single shower cubicles and changing space for mixed use. 4. The showers do not need to be dedicated to cyclists and can be those shared with other users/uses. **Compliant changing facilities** Compliant changing facilities are defined as those that meet the following: 1. Appropriately sized for the likely/required number of users. The assessor should use their judgement to determine whether the changing area is appropriately sized given the number of cycle storage spaces or showers provided. 2. Changing areas must include adequate space and facilities to hang or store clothing and equipment while changing or showering, e.g. bench seat and/or hooks. 3. Toilet/shower cubicles cannot be counted as changing facilities. **Compliant lockers** Compliant lockers are defined as those that meet the following: 1. The number of lockers is at least equal to the number of cycle spaces required. 2. Lockers are either in, or adjacent to, compliant changing rooms, where provided. 3. The lockers are sized appropriately for the storage of a cyclist's equipment.	2	0	-	

Credit	Requirement	Credits Available	Credits Targeted	Responsibility Of	RIBA Stage Critical
Tra 05: Travel Plan	A travel plan has been developed as part of the feasibility and design stages. A site-specific travel assessment/statement has been undertaken to ensure the travel plan is structured to meet the needs of the site and covers the following (as a minimum): a. Where relevant, existing travel patterns and opinions of existing building or site users towards cycling and walking so that constraints and opportunities can be identified. b. Travel patterns and transport impact of future building users. c. Current local environment for walkers and cyclists (accounting for visitors who may be accompanied by young children) d. Disabled access (accounting for varying levels of disability and visual impairment) e. Public transport links serving the site f. Current facilities for cyclists. The travel plan includes a package of measures to encourage the use of sustainable modes of transport and movement of people and goods during the building's operation and use. If the occupier is known, they must be involved in the development of the travel plan and they must confirm that the travel plan will be implemented post construction and be supported by the building's management in operation. **Existing travel plan** See criterion 3: The credit can be awarded if the assessed building is part of a site that has an existing up to date organisational travel plan that is compliant with BREEAM, is applicable to all building users (in existing and assessed new buildings) and accounts for the additional travel resulting from users of the building undergoing refurbishment or fit-out. **Travel assessment or Statement** see criterion 2: A travel assessment (also referred to as transport assessment) will be required where a proposed refurbishment project is likely to result in significant transpo and related environmental impacts during building operation. For refurbishment or fit-out projects this is generally where there will be a change of use of e.g. from an office to a hotel. The study area for a transport assessment related to a project should be determined in discussion between the developer and appropriate authorities. A transport statement is required where the building is not likely to have a significant transport impact. A transport statement is suitable to demonstrate compliance with BREEAM when the building is expected to generate relatively low numbers of trips or traffic flows, with minor transport impact For further guidance refer to: https://www.gov.uk/government/publications/guidance-on-transport-assessment **Travel plan measures** See criterion 3: The following measures could be considered as part of the travel plan for the site: • Providing priority parking spaces for car sharers • Providing dedicated and convenient cycle storage and changing facilities or improving existing facilities such as through improved security, lighting, provision and access • Restricting and/or charging for car parking • Financial incentives and benefits for walking, cycling or car sharing • Providing information in lobby areas about public transport or car sharing made available. • Improved safe access for pedestrians and cyclists as feasible and within the scope for the existing site (for all types of user regardless of the level of mobility or visual impairment) via improved lighting, way-marking and signage for cyclist and pedestrian routes to adjoining routes, transport nodes and amenities, and provision of new or improved crossing points for pedestrians and cyclists. • Providing suitable taxi drop-off/waiting areas. • Improved lighting, landscaping and shelter to make pedestrian and public transport waiting areas pleasant • Negotiating improved bus services, i.e. altering bus routes or offering discounts. **Where the end user/occupier is not known** See CN1.: A travel plan is still required even if the end user/occupier is not known, albeit that it may only be an interim travel plan or one that broadly addresses all the issues covered in the assessment criteria. The developer must confirm that they will hand over a copy of the travel plan to the building's future tenant(s)/owne occupier, so that it may inform their own travel plan/strategy.	1	1	TRANSPORT CONSULTANT	
Wat 1: Water Consumption	An assessment of the efficiency of the building's domestic water consuming components is undertaken using the BREEAM Wat 01 calculator. The water consumption (litres/person/day) for the assessed building is compared against a notional baseline performance and BREEAM credits awarded as follows: % improvement No. of BREEAM credits	5	3	ARCHITECT PUBLIC HEALTH ENG.	

Credit	Requirement	Credits Available	Credits Targeted	Responsibility Of	RIBA Stage Critical

12.5%	1
25%	2
40%	**3**
50%	4
55%	5

The efficiency of the following ‘domestic scale’ water consuming components must be included in the calculation (where specified):

a. WCs.
b. Urinals.
c. Taps (wash hand basins and where specified kitchen taps and waste disposal unit).
d. Showers.
e. Baths.
f. Dishwashers (domestic and commercial sized).
g. Washing machine (domestic and commercial/industrial sized).

Aim for Performance Level 3, 4

Credit	Requirement	Credits Available	Credits Targeted	Responsibility Of	RIBA Stage Critical
	Table 43 Water efficient consumption levels by component type				

Component	Performance Levels (quoted numbers are minimum performance required to achieve the level)						
	Base	1	2	3	4	5	Unit
WC	6	5	4.5	4	3.75	3	Effective flush volume (litres)
Wash hand basin taps	12	9	7.50	4.50	3.75	3	litres/min
Showers	14	10	8	6	4	3.50	litres/min
Baths	200	180	160	140	120	100	litres
Urinal (2 or more urinals)	7.50	6	3	1.50	0.75	0	litres/bowl/hou
Urinal (1 urinal only)	10	8	4	2	1	0	litres/bowl/hou
Greywater/ rainwater system	0	0	0	25	50	75	% of WC/urina flushing dema met using rec non-potable w
Kitchen tap: kitchenette	12	10	7.50	5	5	5	litres/min
Kitchen taps: restaurant (pre-rinse nozzles only)	10.30	9	8.30	7.30	6.30	6	litres/min
Domestic sized dishwashers	17	13	13	12	11	10	litres/cycle
Domestic sized washing machines	90	60	50	40	35	30	litres/use
Waste disposal unit	17	17	0	0	0	0	litres/min
Commercial sized dishwashers	8	7	6	5	4	3	litres/rack
Commercial/ industrial sized washing machines	14	12	10	7.50	5	4.50	litres/kg

Wat 2: Water Monitoring	The specification of a water meter on the mains water supply to each building; this includes instances where water is supplied via a borehole or other private source. Water-consuming plant or building areas, consuming 10% or more of the building's total water demand, are either fitted with sub meters or have water monitoring equipment integral to the plant or area (see Compliance notes). Each meter (main and sub) has a pulsed output to enable connection to a Building Management System (BMS) for the monitoring of water consumption.	1	1	PUBLIC HEALTH ENG.	

Credit	Requirement	Credits Available	Credits Targeted	Responsibility Of	RIBA Stage Critical
	If the site on which the building is located has an existing BMS, managed by the same occupier/owner (as the new building), the pulsed water meter(s) for the new building must be connected to the existing BMS.				
Wat 3: Leak detection system	A leak detection system which is capable of detecting a major water leak on the mains water supply within the building and between the building and the utilities water meter is installed. The leak detection system must be: a. A permanent automated water leak detection system that alerts the building occupants to the leak OR an in-built automated diagnostic procedure for detecting leaks is installed. 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. c. Able to identify different flow and therefore leakage rates, e.g. continuous, high and/or low level, over set time periods. d. Programmable to suit the owner/occupiers' water consumption criteria. e. Where applicable, designed to avoid false alarms caused by normal operation of large water-consuming plant such as chillers.	1	1	PUBLIC HEALTH ENG.	
Wat 3: Flow control devices	Flow control devices that regulate the supply of water to each WC area/facility according to demand are installed (and therefore minimise water leaks and wastage from sanitary fittings).	1	1	M&E	
Wat 04: Water Efficient Equipment	The design team has identified all unregulated water demands that could be realistically mitigated or reduced. System(s) or processes have been identified to reduce the unregulated water demand, and demonstrate, through either good practice design or specification, a meaningful reduction in the total water demand of the building.	N/A	N/A	-	
	Reducing unregulated water consumption See criterion 2.	BREEAM does not prescriptively define all potential means or solutions for reducing unregulated water consumption. Th design team needs to demonstrate to the assessor that they have identified key areas of water consumption in the buildi and that a reduction in unregulated water consumption has been achieved using existing 'tried and tested' solutions or n innovative solutions relevant to the building and its functional requirements. The following are some examples of solutior deemed to satisfy compliance for a number of different building types or functions (where the unregulated water demand that function is one of/the significant contributor in the building): 1. Drip-fed subsurface irrigation incorporating soil moisture sensors. The irrigation control should be zoned to permit variable irrigation to different planting assemblages. 2. Reclaimed/recovered water from a rainwater collection or waste water recovery system, with appropriate storage, greywater collection from building functions or processes that use potable water, e.g. vehicle wash, training water fire stations, sanitary facilities, irrigation etc. This should take into account the Government Buying Standards[1] wh appropriate to the building type. 3. External landscaping and planting that relies solely on precipitation, during all seasons of the year. 4. All planting specified is restricted to contextually appropriate species that thrive without irrigation and will continue do so in those conditions likely as a result of climate change, i.e. typically warmer and drier conditions.				
	Only irrigation systems present See criterion 1.	Where the only unregulated water demand comes from an irrigation system specified/installed by the building owner, the this system must be used for the purpose of assessing compliance. Where the refurbishment is being undertaken by the tenant and the irrigation system is provided by the building owner, this issue can be excluded from the assessment. Where there are soft landscaped areas however no irrigation systems are specified, and therefore there are no unregula water demands for the building, the credit available under this assessment issue can be awarded by default. Where there are no soft landscaped areas and no other unregulated water demands for the building, this credit is filtered of the assessment.				

<table>
<tr><th>Credit</th><th>Requirement</th><th>Credits Available</th><th>Credits Targeted</th><th>Responsibility Of</th><th>RIBA Stage Critical</th></tr>
<tr><td>Mat 1:
Life Cycle Impacts</td><td>
Up to six credits (option 1): Project lifecycle assessment study

The project uses a life cycle assessment (LCA) tool or undertakes a building information model life cycle assessment (BIM LCA) to measure the life cycle environmental impact of the refurbishment or fit out works.
The LCA covers new materials as relevant to the assessment parts listed in CN7 and indicated in the 'Materials assessment scope' section of the BREEAM Refurbishment and Fit-out Mat 01 calculator (Part B of the tool).
The mandatory requirements identified in the 'Materials assessment tool, method and data' section of the BREEAM Refurbishment and Fit-out Mat 01 calculator have been met.
A member of the project team completes the BREEAM Refurbishment and Fit-out Mat 01 calculator using parts A and B and determines a score based on the robustness of the LCA tool used (Part A of the tool) and the scope of the assessment in terms of the materials specified that have been considered (Part B of the tool)
Where the design team can demonstrate how the LCA has benefited the building in terms of measuring and reducing its environmental impact. See CN14
Where the design team submit the LCA tool output (e.g. Building Information Model (BIM)) for assessing the building to BRE Global (via the project's appointed BREEAM assessor) to inform future potential LCA benchmarking for BREEAM
Credits are awarded in accordance with Table 46

Table 46 Percentage of BREEAM Mat 01 calculator points achieved and credits awarded (Option 1)
<table>
<tr><th>Percentage of BREEAM Mat 01 calculator points achieved (%) (Option 1)</th><th>Credits
Industrial</th><th>All other buildings</th></tr>
<tr><td>10</td><td>1</td><td>1</td></tr>
<tr><td>30</td><td>1</td><td>2</td></tr>
<tr><td>50</td><td>1</td><td>3</td></tr>
<tr><td>65</td><td>2</td><td>4</td></tr>
<tr><td>75</td><td>2</td><td>5</td></tr>
<tr><td>80</td><td>2</td><td>6</td></tr>
<tr><td>85</td><td>2 + 1 exemplary</td><td>6 + 1 exemplary</td></tr>
</table>
Up to four credits (option 2): Elemental assessment of environmental performance information
<ol start="8">
Robust environmental performance information has been collected for newly specified materials or where materials are retained in situ, for elements listed in CN7

</td><td>4</td><td>0</td><td>-</td><td></td></tr>
</table>

Credit	Requirement	Credits Available	Credits Targeted	Responsibility Of	RIBA Stage Critical

9. The total number of points achieved as set out in the Methodology section are calculated using Part B of the BREEAM Mat 01 calculator. The number of points scored is based on the percentage of each element that has been:
    a. reused in situ
    b. reused in situ with minor repairs
    c. specified with robust environmental performance information.
10. Credits are awarded based upon the percentage of available points achieved as set out in Table 47

CN7) Part 2 and 3 includes elements used for core and local services including:

a. Heat source, space heating, air-conditioning and ventilation
b. Communication, security and control systems
c. Electrical installations
d. Fire and lightning protection
e. Lift and conveyor installations/systems
f. Water and waste installations
g. Sanitary installations

Table 47 Percentage of BREEAM Mat 01 calculator points achieved and credits awarded (Option 2)

Percentage of BREEAM Mat 01 calculator points achieved (%) (Option 2)	Credits	
	Industrial	All other buildings
10	1	1
40	1	2
60	1	3
75	1	4
85	1 + 1 exemplary	4 + 1 exemplary

Credit	Requirement	Credits Available	Credits Targeted	Responsibility Of	RIBA Stage Critical
	Table 48 Allocation of points awarded **Type of claim** / **Compliant environmental claim** / **Points:** Environmental product declaration — Where at least one product per element type has a third party certificated environmental product declaration that conforms to one of the following standards: ISO 15804 Type 3 EPD; ISO 14025 Type 3 EPD; ISO 14024 Type 1 EPD. — 5 Self declared recycled content — Where newly specified materials have recycled content to ISO 14021 that meets good practice levels of recycled content set out in Choosing construction products, Guide to the recycled content of mainstream construction products, WRAP. — 5 Reused in-situ — Where a whole element or part of an element has been reused in situ and confirmation has been provided that the element complies with current statutory requirements and is fit for purpose (i.e. a minimum design life of at least 5 years) — 5 Reused in situ with minor repairs — Where the whole or part of an element has been reused in situ with minor repairs (see Relevant definitions). — 5				
Mat 01: Exemplary Credit	The following outlines the two exemplary level routes available to achieve up to three innovation credits for this BREEAM issue. Route 1: Using the Green Guide to Specification (elemental approach) - One credit - Where assessing four or more applicable building elements, the building achieves at least two points in addition to the total points required to achieve maximum credits under the standard BREEAM criteria OR - Where assessing fewer than four applicable building elements, the building achieves at least one point in addition to the total points required to achieve maximum credits under the standard BREEAM criteria. Where the assessed building does not specify an element listed – BREEAM Mat 01 calculator allows the BREEAM Assessor to exclude the element from the assessment Route 2: Using compliant life cycle assessment software tools (whole building approach) - Two credits - Where the design team has used an IMPACT compliant software tool (or equivalent) to measure the environmental impact of the building. - Where the design team can demonstrate how the use of an IMPACT compliant software (or equivalent) has benefited the building in terms of measuring and reducing its environmental impact. - Where the design team submit the building information model (BIM) from the IMPACT compliant software tool (or equivalent) for the assessed building to BRE Global (via the project's appointed BREEAM Assessor).	3	0	-	

Credit	Requirement	Credits Available	Credits Targeted	Responsibility Of	RIBA Stage Critical
	Please note a project can achieve all three innovation credits where it is complying with exemplary level criteria i.e. one route is not necessarily exclusive of the other: a project can comply with both routes 1 and 2 or choose to comply with only route 1 or only route 2.				
Mat 03: Sustainable procurement plan.	The principal contractor sources materials for the project in accordance with a documented sustainable procurement plan (see the Relevant definitions in the Additional information section). **Sustainable procurement plan** A plan that sets out a clear framework for the responsible sourcing of materials to guide procurement throughout a project and by all involved in the specification and procurement of construction materials. The plan may be prepared and adopted at an organisational level or be site/project specific, and for the purposes of BREEAM compliance, will cover the following as a minimum: 1. Risks and opportunities are identified against a broad range of social, environmental and economic issues. BS 8902:2009 Responsible sourcing sector certificatic schemes for construction products- Specification can be used as a guide to identify these issues. 2. Aims, objectives and targets to guide sustainable procurement activities. 3. The strategic assessment of sustainably sourced materials available locally and nationally. There should be a policy to procure materials locally where possible. 4. Procedures are in place to check and verify that the sustainable procurement plan is being implemented/adhered to on individual projects. These could include setting out measurement criteria, methodology and performance indicators to assess progress and demonstrate success.	1	1	CLIENT CONTRACTOR	
Mat 03: Responsible sourcing of materials (RSM)	All timber used in the project is responsibly sourced in accordance with the UK Governments Timber Procurement Policy. Materials used in the building must be responsibly sourced in line with the BREEAM tier system, Points are awarded to each material depending on what tier of responsible sourcing they fit into. Credits are awarded as follows: BREEAM Credits — % of tier points achieved 1 — 18% **2 — 36%** 3 — 54%	3	2	CONTRACTOR	
Mat 03: Exemplary Credit	Where at least 70% of the available RSM points are achieved. Exemplary 70%	1	0	-	
Mat 04: Insulation	Any new insulation specified for use within the following building elements must be assessed: a. External walls b. Ground floor c. Roof d. Building services. The Insulation Index for the building fabric and services insulation is the same as or greater than 2.5. See the Methodology section for a description of calculating the Insulation Index.	1	1	M&E	
Mat 05:	**Protecting vulnerable parts of the building from damage.**	1	1	ARCHITECT	

Credit	Requirement	Credits Available	Credits Targeted	Responsibility Of	RIBA Stage Critical
Designing for Durability & Resilience	The building incorporates suitable durability and protection measures or designed features/solutions to prevent damage to vulnerable parts of the internal and external building and landscaping elements. This must include, but is not necessarily limited to: a. Protection from the effects of high pedestrian traffic in main entrances, public areas and thoroughfares (corridors, lifts, stairs, doors etc. b. Protection against any internal vehicular/trolley movement within 1m of the internal building fabric in storage, delivery, corridor and kitchen areas. c. Protection against, or prevention from, any potential vehicular collision where vehicular parking and manoeuvring occurs within 1m of the external building façade for all car parking areas and within 2m for all delivery areas. **Protecting exposed parts of the building from material degradation.** The relevant building elements incorporate appropriate design and specification measures to limit material degradation due to environmental factors. (See Methodology for the process to assess this criterion). See Table – 47 in the Checklists and tables section for a list of applicable elements, environmental factors and material degradation effects to consider.		1		
Mat 06: Material Efficiency	Opportunities have been identified, and appropriate measures investigated and implemented, to optimise the use of materials in building design, procurement, construction, maintenance and end of life, The above is carried out by the design/construction team in consultation with the relevant parties (see CN3) at each of the following RIBA stages: a. Preparation and Brief b. Concept Design c. Developed Design d. Technical Design e. Construction.	1		SPECIALIST COORDINATOR	RIBA 1

Credit	Requirement			Credits Available	Credits Targeted	Responsibility Of	RIBA Stage Critical
	General						
	CN3	Relevant parties	All parties (as relevant to the project stage) involved in the design, specification and/or construction of the building should be consulted. This includes but is not limited to, the following: 1. Client/developer 2. Cost consultant 3. Architect 4. Structural/civil engineers 5. Building services engineers - mechanical, electrical 6. Principal contractor 7. Demolition/strip-out contractor 8. Environmental consultant 9. Project management consultant 10. Materials/component manufacturers/suppliers.				
	CN4	Evidence requirements	BRE has avoided being overly prescriptive with the evidence requirements for this issue, recognising that this is a complex environmental and design issue, where solutions and approaches are largely influenced by building specific factors. The evidence required to demonstrate compl will vary according to RIBA stage. A few examples have been provided below: • Reports (at Preparation and Brief stage) outlining the activity relating to material efficiency (ideas discussed, analysis and decisions ta • Drawings or building information model (BIM), calculations showing reduction of material use through design (Concept Design/Develop Design stages) • Meeting notes, construction program, responsibilities schedule (indicating parties consulted). For further guidance, examples of material efficiency measures have been provided in Table 59 , along with an example of how material effici could be considered through the RIBA plan of works in Table 60 The BREEAM assessor should use their judgement in determining whether the aim and intent of the credit has been met using appropriate pr information to back their judgement. BRE Global will endorse the BREEAM assessor's judgement through the Quality Assurance audit where reasonable justification to award the credit on the basis of project team actions and proposed design solutions is evident.				
Wst 01: Construction Waste Management – Pre-refurbishment Audit	The client shall ensure that a pre-refurbishment audit of all existing buildings, structures or hard surfaces within the scope of the refurbishment or fit-out zone is completed. The requirements for carrying out an appropriate pre-refurbishment audit are a. The audit should be carried out at the Concept Design Stage (equivalent to RIBA stage 2) prior to strip-out or demolition works in order to use the audit results to guide the design, consideration of materials that can be reused, and to set targets for waste management and ensure all contractors are engaged in the process of maximising high-grade reuse and recycling opportunities. b. The audit should be carried out by a competent person (see Relevant Definitions) who is independent of the project, has appropriate knowledge of buildings, waste and options for the reuse and recycling of different waste streams c. Actual waste arisings and waste management routes used should be compared with those forecast from the audit and barriers to achieving targets should be investigated. The audit must be referenced in the resource management plan and cover: d. Identification and quantification of the key materials where present on the project (see Table – 66 of the BREEAM manual) e. Potential applications and any related issues for the reuse and recycling of the key materials in accordance with the waste hierarchy. f. Identification of local reprocesses or recyclers for recycling of materials g. Identification of overall recycling rate for all key materials h. Identification of reuse targets where appropriate. i. Identification of overall landfill diversion rate for all key materials.			1	1	CLIENT STRIP-OUT PRE-DEMO CONTRACTOR	RIBA 2

<table>
<tr><th>Credit</th><th>Requirement</th><th>Credits Available</th><th>Credits Targeted</th><th>Responsibility Of</th><th>RIBA Stage Critical</th></tr>
<tr><td>Wst 01:
Reuse and direct recycling of materials</td><td>Where waste material types detailed in Table – 64 are either directly re-used on-site or off-site or are sent back to the manufacturer for closed loop recycling
One credit is achieved where 50% of the total available points for the waste material types detailed in Table – 64, that are present on the project have been achieved (using the Was 01 calculator tool, see Table – 65 in the Methodology section).
Two credits are achieved where 75% of the total available points for the waste material types detailed in Table – 64, that are present on the project have been achieved (using the Was 01 calculator tool, see Table – 65 in the Methodology section</td><td>2</td><td>0</td><td>-</td><td></td></tr>
<tr><td>Wst 01:
Resource Efficiency</td><td>Develop and implement a compliant resource management plan covering the waste arising from the refurbishment or fit-out project with the aim of minimising waste (see Relevant definitions), recording and reporting accurate data on waste arising
The non-hazardous waste relating to on-site refurbishment or fit-out, and dedicated off-site manufacture or fabrication processes generated by the building’s design and construction meets, or exceeds, the resource efficiency benchmarks set out in
Table – 61 and Table – 62 as relevant to the project type.
Table – 61: (Combinations of Parts Refurbishment and fit-out waste resource efficiency benchmarks - Refurbishment 1 - 4)
<table><tr><th>BREEAM credits</th><th>m3</th><th>Tonnage</th></tr><tr><td>One</td><td>≤11.3</td><td>≤3.5</td></tr><tr><td>Two</td><td>≤4.5</td><td>≤1.2</td></tr><tr><td>Three</td><td>≤2.1</td><td>≤0.4</td></tr><tr><td>Exemplary Level</td><td>≤1.4</td><td>≤0.3</td></tr></table>Table - 62: Refurbishment and fit-out waste resource efficiency benchmarks - Part 4 only
<table><tr><th>BREEAM credits</th><th>m3</th><th>Tonnage</th></tr><tr><td>One</td><td>≤9.4</td><td>≤3.1</td></tr><tr><td>Two</td><td>≤4.3</td><td>≤1.6</td></tr><tr><td>Three</td><td>≤2.4</td><td>≤0.6</td></tr><tr><td>Exemplary Level</td><td>≤1.4</td><td>≤0.4</td></tr></table></td><td>3</td><td>2</td><td>CONTRACTOR</td><td></td></tr>
</table>

<table>
<tr><th>Credit</th><th>Requirement</th><th>Credits Available</th><th>Credits Targeted</th><th>Responsibility Of</th><th>RIBA Stage Critical</th></tr>
<tr><td>Wst 01:
Diversion of Resources from landfill</td><td>The following percentages of non-hazardous construction (on-site and off-site manufacture/fabrication in a dedicated facility), demolition and excavation waste (where applicable) generated by the project have been diverted from landfill:

Table - 63: Diversion of waste for refurbishment and fit-out

<table>
<tr><th>BREEAM credits</th><th>Source of Waste</th><th>Volume</th><th>Tonnage</th></tr>
<tr><td>One credit</td><td>Refurbishment / fit-out
Demolition</td><td>85%
90%</td><td>90%
95%</td></tr>
<tr><td>Exemplary Level</td><td>Refurbishment / fit-out
Demolition</td><td>95%
95%</td><td>97%
97%</td></tr>
</table>
</td><td>1</td><td>1</td><td>CONTRACTOR</td><td></td></tr>
<tr><td>Wst 01:
Exemplary Credit</td><td>Non-hazardous construction waste generated by the building's design and refurbishment or fit-out is no greater than the exemplary level resource efficiency benchmark (outlined in Table - 62 and Table – 61)

The percentage of non-hazardous construction and demolition (if relevant) waste diverted from landfill meets or exceeds the exemplary level percentage benchmark (outlined in Table – 63.)

Waste materials will be sorted into separate key waste groups (according to the waste streams generated by the scope of the works; the List of Wastes/European Waste Catalogue code should be referenced) either on-site or off-site through a licensed contractor for recovery.

75% of difficult to manage wastes have been reused on or off-site rather than recycled, in accordance with Table – 64.</td><td>2</td><td>0</td><td>-</td><td></td></tr>
<tr><td>Wst 02:
Recycled aggregates</td><td>The percentage of high grade aggregate that is recycled or secondary aggregate, specified in each application (present) must meet the following minimum % levels (by weight or volume) to contribute to the total amount of recycled or secondary aggregate, as specified in.

The total amount of recycled or secondary aggregate specified, and meeting criterion 1, is greater than 25% (by weight or volume) of the total high-grade aggregate specified for the development. Where the minimum level in criterion 1 is not met for an application, all the aggregate in that application must be considered as primary aggregate when calculating the total high-grade aggregate specified.

The recycled or secondary aggregates are EITHER: a. Construction, demolition and excavation waste obtained on-site or off-site OR b. Secondary aggregates obtained from a non-construction post-consumer industrial by product source (see Relevant definitions section).

<table>
<tr><th>Application</th><th>Min % (One credit)</th></tr>
<tr><td>Bound</td><td></td></tr>
<tr><td>Structural frame</td><td>15%</td></tr>
<tr><td>Floor slabs including ground floor slabs</td><td>30%</td></tr>
</table>
</td><td>N/A</td><td>N/A</td><td>-</td><td></td></tr>
</table>

Credit	Requirement	Credits Available	Credits Targeted	Responsibility Of	RIBA Stage Critical
	Bitumen or hydraulically bound base, binder, and surface courses for paved areas and roads: 20% Concrete road surfaces: 15% Unbound Pipe bedding: 100% Granular fill and capping: 100% Gravel landscaping: 100%				
Wst 02: Exemplary Credit	The following outlines the exemplary level criteria to achieve an innovation credit for this BREEAM issue. - The percentage of high-grade aggregate that is recycled or secondary aggregate, specified in each application (present) must meet the exemplary minimum levels (by weight or volume), as defined in the table below. Where this minimum level is not met, all the aggregate in that application must be considered as primary aggregate when calculating the total high-grade aggregate specified. - Where the total amount of recycled or secondary aggregate specified is greater than 35% (by weight or volume) of the total high-grade aggregate specified for the project. Where the minimum level in criterion 1 is not met for an application, all the aggregate in that application must be considered as primary aggregate when calculating the total high-grade aggregate specified. - The contributing secondary aggregate must not be transported more than 30 km by road transport. **Application** / **Min % (Exemplary)** Bound Structural frame: 30% Floor slabs including ground floor slabs: 75% Bitumen or hydraulically bound base, binder, and surface courses for paved areas and roads: 35% Concrete road surfaces: 45% Unbound Pipe bedding: N/A Granular fill and capping: N/A Gravel landscaping: 100%	N/A	N/A	-	
Wst 03: Operational Waste	Dedicated space(s) is provided for the segregation and storage of operational recyclable waste volumes generated by the assessed building/unit, its occupant(s) and activities. This space must be: a) Clearly labelled, to assist with segregation, storage and collection of the recyclable waste streams	1	1	ARCHITECT	

Credit	Requirement	Credits Available	Credits Targeted	Responsibility Of	RIBA Stage Critical
	b) Accessible to building occupants / facilities operators for the deposit of materials and collections by waste management contractors c) Of a capacity appropriate to the building type, size, number of units (if relevant) and predicted volumes of waste that will arise from daily/weekly operational activities and occupancy rates. Where the consistent generation in volume of the appropriate operational waste streams is likely to exist, e.g. large amounts of packaging or compostable waste generated by the building's use and operation, the following facilities are provided: a) Static waste compactor(s) or baler(s); situated in a service area or dedicated waste management space. b) Vessel(s) for composting suitable organic waste resulting from the building's daily operation and use OR adequate space(s) for storing segregated food waste and compostable organic material prior to collection and delivery to an alternative composting facility. c) Where organic waste is to be stored / composted on site, a water outlet is provided adjacent to or within the facility for cleaning and hygiene purposes.				
Wst04: Speculative finishes	One credit - Speculative floor and ceiling finishes Office building types only 1. For tenanted areas (where the future occupant is not known), prior to full fit-out works, interior finishes (including carpets, other floor finishes, ceiling finishes and any other interior finishes) have been installed in a show area only. 2. In a building being refurbished or fitted out for a specific occupant, that occupant has selected (or agreed to) the specified interior finishes.	1	1	ARCHITECT	
Wst 05: Adaption to climate change Structural & fabric resilience	Conduct a climate change adaptation strategy appraisal for structural and fabric resilience by the end of Concept Design (RIBA Stage 2 or equivalent), in accordance with the following approach: a. Carry out a systematic (structural and fabric resilience specific) risk assessment to identify and evaluate the impact on the building over its projected life cycle from expected extreme weather conditions arising from climate change and, where feasible, mitigate against these impacts. The assessment should cover the following stages: i. Hazard identification ii. Hazard assessment iii. Risk estimation iv. Risk evaluation v. Risk management.	1	0	-	RIBA 2
Wst 05: Exemplary Credit	A holistic approach to the design and construction of the current building's life cycle, to mitigate against the impacts of climate change, is represented by the achievement of these criteria. The following outlines the exemplary level criteria to achieve an innovation credit for this BREEAM issue: - Achievement of the Structural and fabric resilience criterion in this issue and the following criteria points or credits: **1) Hea 04 Thermal comfort:** (Link to Wst 05 issue: - to preventing increasing risks of overheating) - Criterion 6 in the second credit of the Hea 04 issue has been achieved. **2) Ene 01 Reduction of energy use and carbon emissions:** (Link to Wst 05 issue: to maximise energy efficiency contributing to low carbon emissions resulting from increasing energy demands) - At least eight credits in this issue have been achieved. **3) Ene 04 Low carbon design:** (Link to Wst 05 issue: to maximise opportunities to avoid unnecessary carbon emissions) - The Passive design analysis credit in this issue has been achieved. **4) Wat 01 Water consumption:** (Link to Wst 05 issue: to minimise water demands in periods of drought) - A minimum of three credits in this issue have been achieved. **5) Mat 05 Designing for durability and resilience:** (Link to Wst 05 issue: to avoid increased risks of deterioration and higher maintenance demands) - Criterion 2 relating to material degradation in this issue has been achieved.	1	0	-	

Credit	Requirement	Credits Available	Credits Targeted	Responsibility Of	RIBA Stage Critical
	6) Pol 03 Surface water run-off: - Link to Wst 05 issue: to minimise the risks of increased flood risk and surface water run-off affecting the site or others) - Flood risk – a minimum of one credit has been achieved. Surface water run-off – two credits have been achieved.				
Wst 06: Functional Adaptability	A building-specific functional adaptation strategy study has been undertaken by the client and design team by Concept Design (RIBA Stage 2 or equivalent), which includes recommendations for measures to be incorporated to facilitate future adaptation. Functional adaptation measures have been implemented (RIBA Stage 4 or equivalent) in accordance with the functional adaptation strategy recommendations, where practical and cost effective. Omissions have been justified in writing to the assessor.	1	1	ARCHITECT	RIBA 2
LE 02: Protection of Ecological Features	All existing features of ecological value within and surrounding the refurbishment or fit-out zone and site boundary area are adequately protected from damage during clearance, site preparation and refurbishment or fit-out activities in line with BS42020: 2013. In all cases, the principal contractor is required to construct ecological protection recommended by the Suitably Qualified Ecologist (SQE), prior to any preliminary site refurbishment or fit-out or preparation works (e.g. erection of temporary site facilities).	1	N/A	-	
LE 04: Enhancing Site Ecology	A suitably qualified ecologist (SQE) has been appointed by the client or their project representative by the end of the Preparation and Brief stage (RIBA Stage 1 or equivalent) to advice on enhancing the ecology of the site at an early stage. The SQE has provided an Ecology Report with appropriate recommendations for the enhancement of the site's ecology at Concept Design stage (RIBA Stage 2 or equivalent). The report is based on a site visit/survey by the SQE (see also CN6). The early stage advice and recommendations of the Ecology Report for the enhancement of site ecology have been, or will be, implemented in the final design and build.	1	1	ECOLOGY CONSULTANT ARCHITECT	RIBA 1
LE 05: Long Term Impact on Biodiversity	Where a Suitably Qualified Ecologist (SQE) is appointed prior to commencement of activities on-site and they confirm that all relevant UK and EU legislation relating to the protection and enhancement of ecology has been complied with during the design and construction process. Where a landscape and habitat management plan, appropriate to the site, is produced covering at least the first five years after project completion in accordance with BS 42020:2013 Section 11.1. This is to be handed over to the building owner/occupants for use by the grounds maintenance staff. Where additional measures to improve the assessed site's long term biodiversity are adopted: 2 additional measures are met 1 Credit can be awarded: 4 additional measures are met 2 Credits can be awarded: 1. The principal contractor nominates a Biodiversity Champion with the authority to influence site activities and ensure that detrimental impacts on-site biodiversity are minimised in line with the recommendations of a Suitably Qualified Ecologist. 2. The principal contractor trains the site workforce on how to protect site ecology during the project. Specific training must be carried out for the entire site workforce to ensure they are aware of how to avoid damaging site ecology during operations on-site. Training should be based on the findings and recommendations for protection of ecological features highlighted within a report prepared by a Suitably Qualified Ecologist. 3. The principal contractor records actions taken to protect biodiversity and monitor their effectiveness throughout key stages of the construction process. The requirement commits the principal contractor to make such records available where publicly requested. 4. Where a new ecologically valuable habitat appropriate to the local area is created. This includes a habitat that supports nationally, regionally or locally important biodiversity, and/or which is nationally, regionally or locally important itself; including any UK Biodiversity Action Plan (UK BAP) priority habitats 5. Local Biodiversity Action Plan (LBAP) habitats, those protected within statutory sites (e.g. SSSIs), or those within non-statutory sites identified in local plans. Local biodiversity expertise should be sought during the Preparation and Brief (RIBA Stage 1 or equivalent) to help identify species of local biodiversity importance on-site and ensure that the proposals support local priorities. 6. Where flora and/or fauna habitats exist on-site, the contractor programmes site works to minimise disturbance to wildlife. For example, site preparation, ground works, and soft landscape have been, or will be, scheduled at an appropriate time of year to minimise disturbance to wildlife. Timing of works may have a significant impact on, for example, breeding birds, flowering plants, seed germination, amphibians etc. Actions such as phased clearance of vegetation may help to mitigate ecological impacts. This additional requirement will be achieved where a clear plan has been produced detailing how activities will be timed to avoid any impact on-site biodiversity in line with the recommendations of a Suitably Qualified Ecologist.	2	2	ECOLOGY CONSULTANT CONTRACTOR	RIBA 1

Credit	Requirement	Credits Available	Credits Targeted	Responsibility Of	RIBA Stage Critical
Pol 01: Impact of Refrigerants Pre-requisite Pol 01: Impact of refrigerants	All systems (with electric compressors) must 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 Systems Code of Practice **Two Credits:** Where the systems are using, refrigerants have Direct Effect Life Cycle CO_2 equivalent emissions (DELC CO_2e) of ≤ 100 $kgCO_2e/kW$ cooling/heating capacity. To calculate the DELC CO_2e please refer to the Relevant definitions in the Additional information section and the Methodology section. OR Where air-conditioning or refrigeration systems are installed the refrigerants used have a Global Warming Potential (GWP) ≤ 10. **One Credit:** OR Where the systems are using, refrigerants have Direct Effect Life Cycle CO_2 equivalent emissions (DELC CO_2e) of ≤ 1000 $kgCO_2e/kW$ cooling/heating capacity.	2	0	-	
Pol 01: Leak Detection	Where systems are using, refrigerants have a permanent automated refrigerant leak detection system installed; OR where an in-built automated diagnostic procedure for detecting leakage is installed. In all instances a robust and tested refrigerant leak detection system must be installed and must be capable of continuously monitoring for leaks. 7. The system must be capable of automatically isolating and containing the remaining refrigerant(s) charge in response to a leak detection incident (see Other information section for additional information).	1	0	-	
Pol 02: NOx emissions	Where the plant installed to meet the building's delivered heating and hot water demand has, under normal operating conditions, a NOx emission level (measured on a dry basis at 0% excess O2) as follows: - 1 credit: 100 mg/kWh (space heating) - 2 credits: 70 (space heating) - 3 credits: 40 (space heating)	3	0	-	
Pol 03: Flood Risk Management	**Low Flood Risk:** Where flood maps from the appropriate statutory body (see Relevant definitions) confirm the refurbishment or fit-out is situated in a flood zone that is defined as having a low annual probability of flooding. OR The project meets the requirements for avoidance of flooding in accordance with Checklist 1, (see Checklists and tables), e.g. where the refurbishment or fit-out zone is of a floor level that is 0.3m higher than the obtained/estimated flood level and safe access/escape routes are available/present **Medium/ High Flood Risk:** Where flood maps from the appropriate statutory body (see Relevant definitions) confirm the site has a medium or high flood risk and a site-specific FRA has been undertaken (as relevant to size of project in accordance with CN7). The FRA must take all current and future sources of flooding into consideration in accordance with compliance note. Where the refurbishment or fit-out zone achieves avoidance from flooding through either: a. The refurbishment and fit-out zone is located entirely on the first floor or above and a flood emergency plan has been developed in accordance with 'Would your business stay afloat? A Guide to preparing your business for flooding', Environment Agency, 2011 b. As a result of the building's floor level or measures to keep water away, the building is defined as achieving avoidance from flooding by following Checklist A-1, Checklists and tables. Where avoidance is not possible, two credits are achieved where a full flood resilience/resistance strategy is implemented for the building's scope of works in accordance with recommendations made by a Suitably Qualified Building Professional. The following aspects of the design should be addressed for the relevant parts, in accordance with best practice guidance (see compliance note CN9):	2	2	FLOOD RISK CONSULTANT	

Credit	Requirement	Credits Available	Credits Targeted	Responsibility Of	RIBA Stage Critical
	a. Part 1: Fabric – using flood resilient materials and flood protection measures for the building fabric, e.g. waterproof materials, impermeable membranes, flood barriers, safe access/exit points in the event of a flood etc b. Part 2: Core services – core services and associated infrastructure (including equipment and vulnerable pipes/ducts/cables etc.) should be located/specified so as to protect services from flooding damage, e.g. location/routing/height, protection of building apertures (such as intakes/extracts/ventilation), non-return valves etc. c. Part 3: Local services – the location/height of local services such as sockets, vents etc. and the location of the wiring/pipework/ductwork in relation to the flood level and other measures to protect local services. d. Part 4: Interior – the proposed function of spaces that are below the flood level (e.g. sacrificial spaces) should be limited to those which are not susceptible to flood damage, and the resilience of materials used for partitions, walls, floors, ceiling finishes, furniture and fittings and the location of equipment in relation to the flood level, e.g. avoid storing flood sensitive materials and functions in spaces that are below the flood level.				
Pol 03: Surface water run-off	One Credit – Neutral Impact on Surface Water There is no increase in the impermeable surfaces as a result of the refurbishment works; OR If there is an increase in the impermeable surface as a result of the refurbishment works then the following must be met: a. Hard standing areas - where there is an extension or increase in the hardstanding areas and hence an increase in the total impermeable area as a result of the refurbishment works, the hardstanding area must be permeable or be provided with on-site SUDs to allow full infiltration of the additional volume, to achieve the same end result. The permeable hardstanding must include all pavements and public rights of way, car parks, driveways and non-adoptable roads, but exclude footpaths that cross soft landscaped areas which will drain onto a naturally permeable surface. b. Building extension - where there is an increase in building footprint, extending onto any previously permeable surfaces, the additional run-off caused by the area of the new extension must be managed on-site using an appropriate SUDs technique for rainfall depths up to 5mm. Two Credits – Reducing Run-off An Appropriate Consultant (see Relevant definitions) has been used to design an appropriate drainage strategy for the site. Either of the following criteria are met: c. There is a decrease in the impermeable area by 50% or more, from the pre-existing impermeable hard surfaces; OR d. Where run-off as a result of the refurbishment is managed on-site using source control achieving the following requirements: i. The peak rate of run-off as a result of the refurbishment for the 1 in 100-year event has been reduced by 50% from the existing site. ii. The total volume of run-off discharged into the watercourses and sewers as a result of the refurbishment, for a 1 in 100-year event of 6-hour duration has been reduced by 50%. iii. An allowance for climate change must be included for all of the above calculations; this should be made in accordance with current best practice planning guidance.	N/A	N/A		
Pol 03: Minimising watercourse pollution	There is no discharge from the developed site (includes new and existing hard landscaping and buildings) for rainfall up to 5mm (confirmed by the Appropriate Consultant). Where suitable pollution prevention measures are put in place (or already exist) for the different sources of pollution present on the assessed site, in accordance with compliance note CN20. A comprehensive and up to date drainage plan of the site will be made available for the building/site occupiers. Relevant maintenance agreements for the ownership, long term operation and maintenance of all specified SUDs must be in place.	N/A	N/A	-	
Pol 04 Reduction of Night-time Light Pollution	Where external lighting pollution has been eliminated through effective design that removes the need for external lighting without adversely affecting the safety and security of the site and its users. OR alternatively, where the building does have external lighting, one credit can be awarded as follows:	1	1	M&E	

Credit	Requirement	Credits Available	Credits Targeted	Responsibility Of	RIBA Stage Critical
	The external lighting strategy has been designed in compliance with Table 2 (and its accompanying notes) of the ILP Guidance notes for the reduction of obtrusive light, 2011 All external lighting (except for safety and security lighting) can be automatically switched off between 23:00 and 07:00. If safety or security lighting is provided and will be used between 23:00 and 07:00, this part of the lighting system complies with the lower levels of lighting recommended during these hours in Table 2 of the ILP's Guidance notes. Illuminated advertisements, where specified, must be designed in compliance with ILE Technical Report 5 – The Brightness of Illuminated Advertisements.				
Pol 05: Reduction of noise pollution	Where there are, or will be, no noise-sensitive areas or buildings within 800m radius of the assessed development. OR Alternatively, where the building does have noise-sensitive areas or buildings within 800m radius of the development, one credit can be awarded as follows: a. a. Where a noise impact assessment in compliance with BS 7445 has been carried out and the following noise levels measured/determined: i. Existing background noise levels at the nearest or most exposed noise-sensitive development to the proposed development or at a location where background conditions can be argued to be similar. ii. The rating noise level resulting from the new noise source (see CN4). The noise impact assessment must be carried out by a suitably qualified acoustic consultant holding a recognised acoustic qualification and membership of an appropriate professional body (see Relevant definitions in the Additional information section). The noise level from the proposed site/building, as measured in the locality of the nearest or most exposed noise-sensitive development, is a difference no greater than +5dB during the day (07:00 to 23:00) and +3dB at night (23:00 to 07:00) compared to the background noise level. Where the noise source(s) from the proposed site/building is greater than the levels described in criterion 4, measures have been installed to attenuate the noise at its source to a level where it will comply with criterion 4.	1	1	ACOUSTIC CONSULTANT	

UK and Ireland Office Locations